THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

Vol. XXXII. No. 811.] LONDON, NOVEMBER 26, 1878. [30th Year.] Price 6d.

COOKE BROS.

See Page 794.

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GENUINE TORBAY PAINT
And SPECIAL GASOMETER PAINT.
Several Prize Medals. Established over 20 Years.
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JOSEPH COWEN and CO.,
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J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
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WET AND DRY GAS-METERS,
Licensees and Manufacturers of
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STREET-LAMPS, &c., &c.
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Manufacturers of
TELESCOPIC & SINGLE GASHOLDERS,
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And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
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Roofs, Girders, and Bridges, and General Smith's Work.

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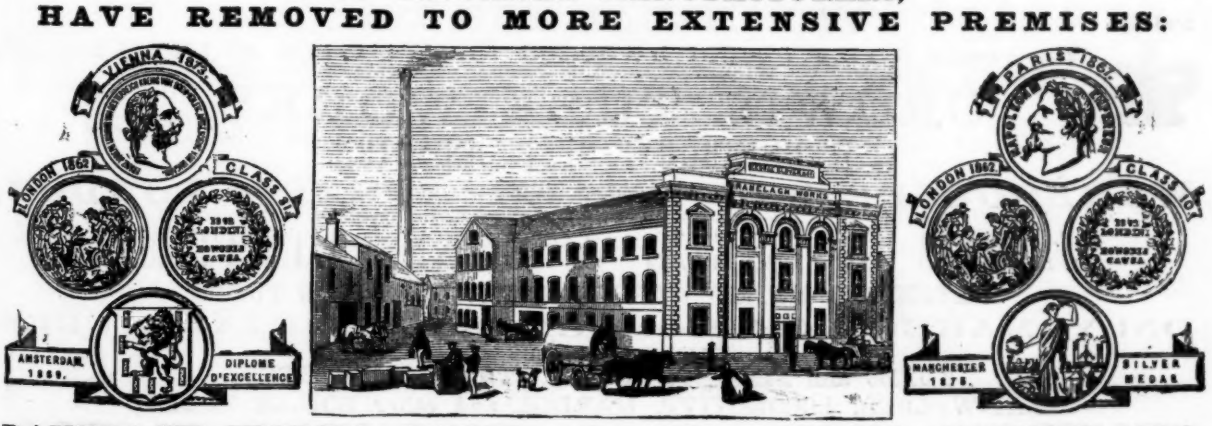
CHANGE OF ADDRESS.
GEORGE GLOVER AND CO.,
DRY GAS-METER MANUFACTURERS,
HAVE REMOVED TO MORE EXTENSIVE PREMISES:



RANELAGH WORKS, ROYAL AVENUE, CHELSEA, LONDON, S.W.

SILVER MEDAL, PARIS EXHIBITION, 1867.

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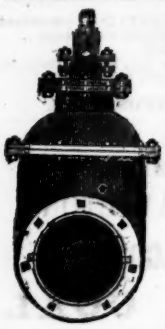
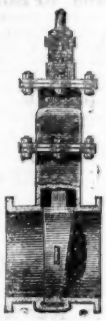
CHANDELIERS, &c., GAS-FITTERS' TOOLS, GAS TONGS, STOCKS, TAPS, DIES, &c., &c.,
HANDRAIL TUBINGS, IRON AND BRASS, PLAIN OR TWISTED,
TELEGRAPH TUBES OR POLES, &c., &c.



C. & W. WALKERS' DOUBLE-FACED GAS-VALVES.



These solidly constructed double-faced Gas-Valves have taken the place of the old system of the light, single-faced disc, which is too uncertain and unreliable in large bores.

They are guaranteed absolutely gas-tight. They are very massive and rigid, and by improved modes of manufacture they are produced at very little excess in cost over the old light, weak system, which is liable to spring and bend, and become leaky.

The Valve is a rigid wedge of solid cast iron, having two perfectly scraped surfaced facings fitting between the two on the body, which are also surfaced.

A spring in two short halves, and, therefore, not liable to break, is used only for scraping the front facing clean.

The front facing is vertical; the back facing forms the wedge.

At a slight additional expense both flanges are faced to bolt to main-pipes.

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By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

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STANDARD WASHER AND SCRUBBER.

[KIRKHAM, HULETT, AND CHANDLER'S PATENT.]

Some of the advantages claimed for this Apparatus are as follow:—

The Exposing of a large Amount of Effectually-wetted Surface (which is continually reproduced) to act upon the Gas.
Unerring Regularity in the Distribution of the Liquor.
Saving of Expense in Providing and Exchanging Scrubbing Material—none being required.
Economy of Space, thus enabling the Apparatus to be protected from the Weather.
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It works without Pressure.
It is particularly adapted for Gas-Works where Sulphate of Ammonia is manufactured.

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This apparatus effects the most intimate contact between the liquor with which it is supplied and the gas passing through it, resulting in the complete removal of all particles of tar, increasing the ammonia strength of the scrubber and condenser liquor, and removing a large proportion of other impurities—notably, carbonic acid. The Washer is intended to work in conjunction with a scrubber. It occupies little space, and is inexpensive. It has been in successful constant use for nearly three years, does not become clogged with tar or corroded by the action of the liquor or gases, it gives three inches of pressure, and only needs a supply of liquor to keep it in regular action without any further attention.

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CONTRACTORS FOR GAS & WATER WORKS, GENERAL ENGINEERS, IRONFOUNDERS & MANUFACTURERS OF

GASHOLDERS, TANKS, PURIFIERS,

SCRUBBERS, VALVES, EXHAUSTERS, IRON ROOFS, BRIDGES, BOILERS, AND GENERAL CAST AND WROUGHT IRON WORKS.

S. C. & SONS undertake the entire erection of New, or Remodelling of existing Gas-Works in any part of the World, including small Works for MANSIONS, FACTORIES, &c., or Works of the largest extent (are now constructing the largest Gasholder yet erected); also the supplying and laying of MAINS.

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DESCRIPTION OF MORRIS & CUTLER'S PATENT CONDENSER.—The Condenser may consist of pipes arranged in tiers, or in any other form most convenient to the site available, each tier being connected with special connections, and containing within same either one or more coils of smaller pipe through which water is passed, being supplied from any convenient source of supply, the water passing in an opposite direction to the gas, so that the coldest water is at the gas outlet. The power of the Condenser can be regulated precisely in proportion to the quantity of water allowed to pass through, which is not in any way contaminated, but simply heated by the hot gas, and advantage can be taken of its being at a high level to carry it to a high-level cistern, from whence it can be used for supply to boiler or any other purpose. The Condenser itself may form the support for a high-level cistern. By an arrangement of valves the water may be shut off, and an air orifice opened, when air will pass through instead of water, or both air and water can be shut off. The power of the Condenser is, therefore, entirely under control. The Condenser may be seen in operation at the Brentford Gas-Works.

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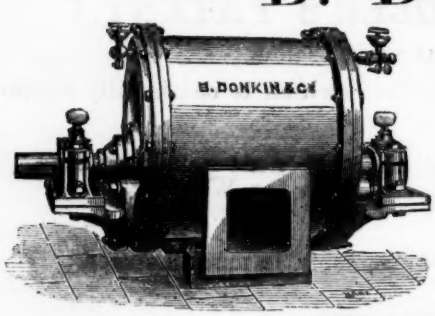

These Exhausters have but one solid slide, which ensures less wear and friction, and thus fewer repairs are necessary. They are made with two outside bearings and with all latest improvements.

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STEAM-ENGINES FOR DRIVING GAS EXHAUSTERS.
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VALVES FOR AMMONIACAL LIQUOR, TAR, and HYDRAULIC MAINS,
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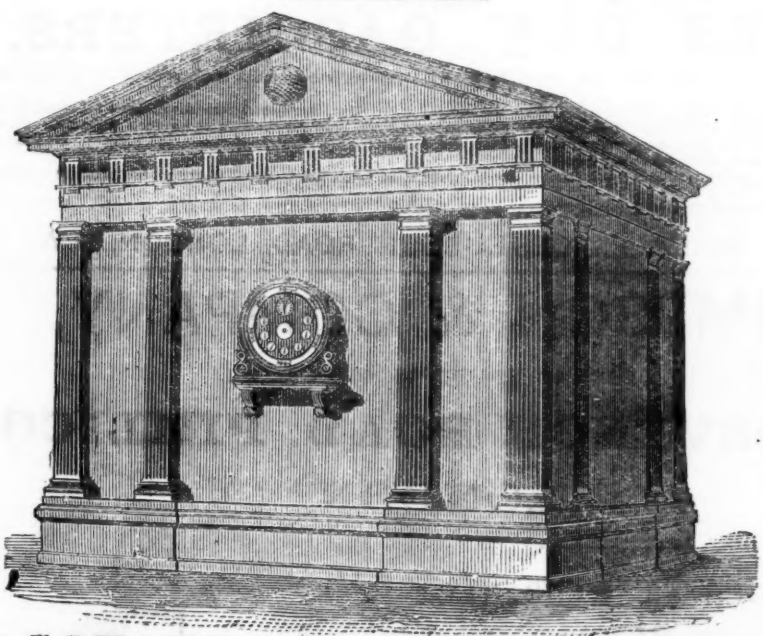

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Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

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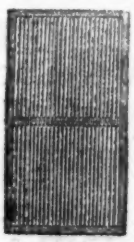

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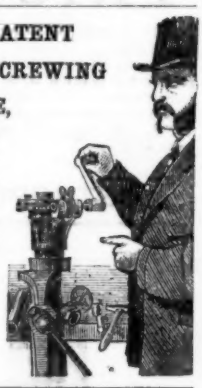

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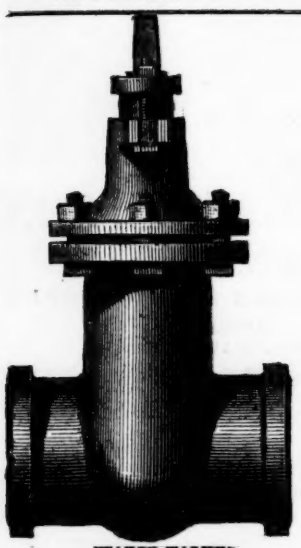

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SCREW-COCKS, HYDRANTS,

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And all other Machinery for

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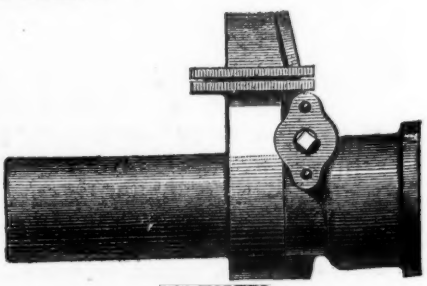

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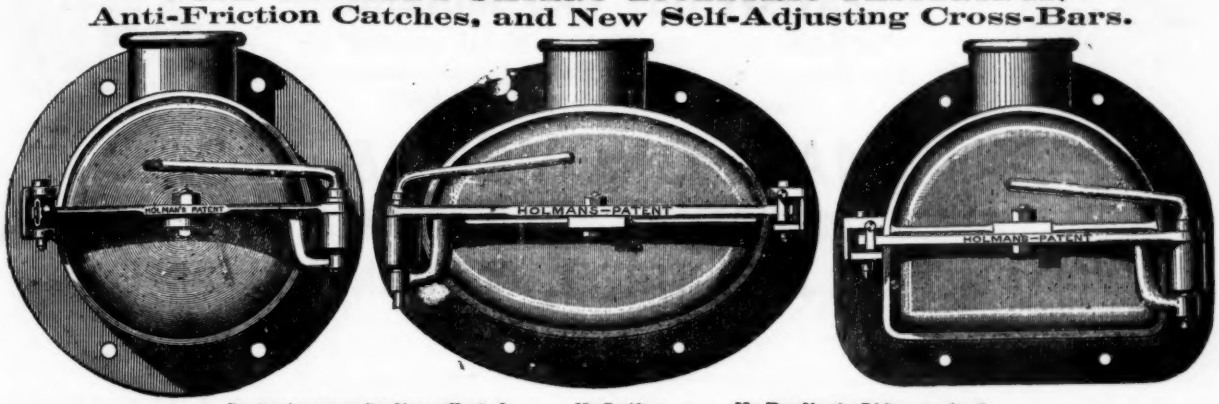
WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.

Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested, being now in use in nearly all the principal Gas-Works in London and the Provinces.

T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT (see Illustrations above), as well as bringing the Mouthpiece from the D or Oval at back to Circular in front, as heretofore.

D and Oval Morton's Lids are working satisfactorily both in this country, on the Continent, and in the United States of America. Among others they have been adopted by the following Gas-Works:—

The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at an convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

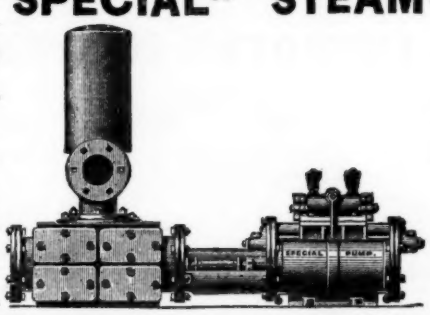
Yours truly,

(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION.

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	20
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have over FORTY "Special" Steam-Pumps in use at their several large Tar-Works.

Two Hundred Sizes made. Those in Table opposite are the leading Sizes for use in Gas-Works and Chemical Works.

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

TANGYE'S HIGH-PRESSURE AND CONDENSING STEAM-ENGINES; CORNISH, VERTICAL, & TUBULAR BOILERS; HYDRAULIC AND SCREW LIFTING-JACKS, CRABS, PULLEY-BLOCKS, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, ETC., ON APPLICATION.

London, 1851 | New York, 1853. | Paris, 1855. | London, 1862.

Dublin, 1865. | Paris, 1867.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

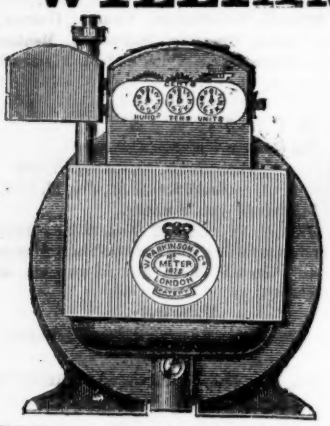
214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON AND CO.,



(ESTABLISHED 1816,)

MANUFACTURERS OF

WET & DRY METERS,

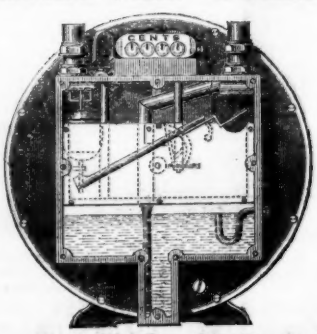
STATION-METERS & GOVERNORS,

EXHAUSTER REGULATORS,

PRESSURE REGISTERS, EXPERIMENTAL APPARATUS, GAUGES, WATER-METERS, &c.

HUNT'S PATENT IMPROVED COMPENSATING METER.

In this Meter, the action of the measuring-drum is reversed. By this arrangement an improvement is effected in the registration at high speeds, which, in many tests, has not varied from the smallest light to three times the capacity of the meter. It works equally well under all pressures. The range of error between the high and low line is much smaller than that allowed by the "Sale of Gas Act."



The Meter has been critically tested, and most favourably reported upon by official Meter Inspectors in London and Birmingham.

W. PARKINSON and CO. have made arrangements for the manufacture of these Meters, both in tin and cast-iron cases, and for the alteration of old ones to this principle, which is confidently recommended as possessing every quality that can be desired by Gas Companies, Corporations, or Private Consumers.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

E. S. S., Grantham.—*We are quite unaware that Billingsgate Market was lighted by electricity on the evening you mention. The first public display was announced for Friday, the 15th inst., but did not take place for the reasons stated in last* Journal. *One is proposed to come off just as we go to press. Whether it takes place or not, our readers will learn next week.*

Mr. Malam on the Leakage of Gas at Halifax.—*We have received a letter from Mr. Carr in answer to Mr. Malam's letter in last week's* Journal. *Both gentlemen have had a fair hearing, and the present letter does not advance matters at all. It would only provoke a reply from Mr. Malam; so we think, to quote Mr. Carr's own words, it is unadvisable to "pursue a useless correspondence on a personal question."*

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, NOVEMBER 26, 1878.

Circular to Gas Companies.

Without for a moment believing the electric light will for many years be an established institution in this country, we are happy to see that most of the Gas Companies who have issued announcements of their intention to apply to Parliament for further powers, make application for authority to use and supply that light. There are, we believe, two opinions as regards the rights and powers which Companies and Corporations now possess to supply illuminating agents other than coal gas, but we consider it preferable that the privileges of Companies should be placed beyond dispute, and for this reason we advise all Companies to obtain distinct and special powers to supply the new illuminant. The monopoly of a Gas Company is not complete until it includes the exclusive power to furnish every mode of illumination. This power may seem too wide to suit the purposes of some, but when it is considered how large is the stake Gas Companies have risked in the supply of light, it will be recognized that the most extensive powers should be conferred on them. We venture to express regret that the trials about to be made of the new light will not be undertaken by Gas Companies. The Chartered Company, for example, have now had sufficient experience to have enabled them to light up the Embankment, Waterloo Bridge, and Billingsgate. Doubtless, obstacles would have stood in their way, but these might not have been insurmountable, and it would have been a grand triumph for a Gas Company to lead the way in electric illumination.

There is, besides, a well-founded doubt as to whether the powers conferred by the ordinary Gas Acts will enable Companies and Corporations to supply fittings, or to let cooking and heating stoves out on hire. We are glad to see that efforts are about to be made to have this doubt removed. In the present crisis, if we may so call it, it is most essential that the widest powers should be obtained. It is highly desirable that the consumption of gas should be promoted in every possible way, and the opportunity which is most freely open is the encouragement of day consumption. For some reason or other—no doubt supposed economy—consumers hesitate to incur the outlay necessary for a cooking or a heating stove, and go on using their wasteful ranges and grates, when a small expenditure would result in the saving of pounds a year. It is this which, in a double interest, Gas Companies must endeavour to stop. In the winter months, which are now upon us, there is little, perhaps, to be done, but much may be accomplished by the time the powers which are now so freely sought for are obtained. We do not think that any Gas Company need fear Chancery proceedings to stop them in their enterprise. Shareholders will not object to having the dividends ensured, and stove makers will not be offended at the proposed innovation, inasmuch as their apparatuses will be patronized.

Among the Companies going to Parliament to obtain these new powers, we notice Preston, Plymouth, the Alliance and Dublin, Newcastle-on-Tyne and Gateshead, Brighton and Hove, Bromley, and Wisbech; and the Corporations include those of Leeds, Warrington, Blackburn, and Over Darwen, together with some Local Boards. It cannot be doubted that Parliament will freely grant all the new powers which Companies and Local Authorities now ask for. Some novel points are certain to be raised, the chief of which will be the mode of charging for the electric light, always supposing it comes into use. The principle which will, no doubt, be sanctioned may, however, be easily discerned. As regards the cooking and heating stoves, there will be no difficulty in fixing the rate to be charged for them. It will be made on the same principle as that on which meter-rents are now levied.

Among other Gas Companies who propose to go to Parliament for further powers, and who desire to include in them the right to avail themselves of the electric light, is the Lancaster Gas Company. At this the Town Council profess to take alarm, and threaten opposition. They need not be in the least afraid that the Gas Company will succeed in obtaining such exclusive rights as will prejudice the interests of the Corporation, or of any private individual. We have a very strong suspicion that whatever may appear in an Act of Parliament, in relation to the electric light, will be of a somewhat vague character. This much we may take to be certain, that Parliament will never grant to any body, whether a Corporation or a Company, the exclusive privilege of selling the electric light.

The Corporation of Birmingham are promoting a Bill to enable them to make certain alterations in the rates charged by them for gas supplied to some of the outlying districts. We may take it that the Corporation will ask for the widest powers possible, for their gas undertaking has become a matter of the greatest importance to them. We fancy we see that gas will presently be cheaper in the neighbourhood of Birmingham, although it is difficult to say what the abolition of differential rates may mean. The King's Norton Local Board, we rather think, are promoting a Bill to abolish differential rates altogether.

In obedience to some stupid popular clamour, the Town Council of Hereford have decided on postponing the erection of their new gas-works for the next three months. What is to be gained, in consequence of this decision, it is very hard to say. Electric lighting has undoubtedly made great progress within a very short time, but we fancy that, after the lapse of three months, it will be much in the same position as now. In the meantime, the present gas-works of the Corporation of Hereford are fast becoming inadequate to produce the gas, which will undoubtedly be required, even if the electric light ever takes a prominent place as a public illuminant. We venture to think that there are very few men in England, or even France, capable of exercising their judgment in the matter, who believe that electricity will ever supersede gas as a general illuminating agent. Each may be said to have an allotted sphere—the one for lighting streets and large spaces, covered or not, and the other for lighting our smaller apartments. Then, again, there is the question of increased day consumption, which the Town Council, if they had any enterprise, would do their best

to promote. The undertaking has never been very profitable to the Corporation, nor is it likely to be, unless managed with more energy.

Exhibitions of gas cooking and heating apparatus have become common, but we may just mention, to encourage others, that the Corporation of Huddersfield had a very successful one a few days ago. The result will, no doubt, be, as in most other cases, a large increase in the demand for gas. Hereford may stand still if it so pleases the Town Council; but Huddersfield, like all the energetic northern boroughs, is anxious to make progress.

There seems to be a considerable opposition growing up amongst the owners and ratepayers of Exeter, against the ratification of the purchase of the gas undertaking, and the promotion of a Bill next session to confirm the provisional agreement entered into between the Corporation and the Gas Company. An informal town's meeting was held on Thursday evening last, at which vigorous protests were made; but no decisive expression of the town's opinion can be obtained until the statutory meeting under the Borough Funds Act, 1872, takes place, and this will be held this afternoon. We shall make no further remarks until we know the result of this meeting.

Speaking of Parliament, reminds us to remark that possibly very little may be done in the next and succeeding sessions in connection with home and commercial legislation. A short winter session, followed by a dissolution, and a general election in early spring, will probably stand in the way of making any great progress in the business performed by Committees on Gas and Water Bills. A general election, of course, entirely dislocates our legislative machinery, and it takes a considerable time to get it in fair working order again; and we are afraid that, in consequence, several important measures will have to stand over for consideration for another year.

We publish to-day our usual abstract of the accounts of the Metropolitan Gas Companies for 1877. The publication was, unhappily, delayed by the long illness of the late Proprietor and Editor, who always took much interest in checking the accuracy of the abstract. The accounts of the Companies have now become of such a stereotyped character that they call for but little reference. The progressive prosperity of the Companies is a fact which need not be dwelt upon. It excites the aggressive spirit of our Local Authorities, who are, however, powerless to effect the confiscation which they so much desire. No selection can be made amongst the Companies, or it would be easy to see which the Authorities would prefer to purchase. They must be taken altogether, or left quietly alone. Our abstract shows that considerable additions were made to the capital accounts of most of the Companies during the past year. This alone is an indication of progress, for it means extensions. The great interest of the Tables centres in that which shows "The Capital, Income, Ex-"penditure, and Profit per ton of Coal Carbonized." Our readers will study this table attentively for themselves; it might be deemed invidious if we indulged in some comments suggested. We are sorry to see that there was further falling off in the price of residuals, resulting in a decrease in the income of most of the Companies derived from this source. The matter, we believe, will soon right itself. The winter, at present, promises well for the sale of coke at good prices. Tar and ammoniacal liquor must, we were going to say, take their chance; but, at the present time, long contracts for the sale of either of them would certainly be a mistake. We append, as usual, in this place, the table which follows:—

TABLE *of the Residuals and Gas made, per Ton of Coals Carbonized, by the Metropolis Gas Companies in the Year* 1877.

Name of Company.	Coke per Ton of Coals, in Bushels.	Breeze per Ton of Coals, in Bushels.	Tar per Ton of Coals, in Gallons.	Ammoniacal Liquor per Ton of Coals, in Gallons.	Gas Made. Feet per Ton
CHARTERED	34·07	3·36	9·93	30·36	10,205
COMMERCIAL	33·94	3·37	9·28	28·14	10,038
LONDON	35·06	4·01	9·99	20·05	10,022
PHŒNIX	36·00	2·47	9·53	28·95	10,103
SOUTH METROPOLITAN	35·61	1·94	9·59	22·71	9,736
SURREY CONSUMERS .	33·35	2·65	9·98	19·46	10,075
Mean per ton . .	34·40	3·21	9·83	28·45	10,137

There is only one remark to be made on this table; it shows clearly how admirably the works of the Metropolitan Companies are managed. There may now be said to be an equal quality of gas supplied all over the Metropolitan area. Coals cannot be obtained of even quality, and Gas Managers will differ as to the amount of cannel which should be used; therefore but little inference can be drawn which may serve to guide Managers in their choice of the material to be distilled. There is, however, much in a retort-stack, and in that direction, we think, must we look for an explanation of some of the differences revealed in the above table. Scrubbers and condensers go for much when tar and ammoniacal liquor are concerned; but, when making the above remarks, simply the yield of gas per ton has been considered.

We conclude our report of the meeting of the West of Scotland Association with an interesting paper by Mr. M'Gilchrist, on the "Charging of Gas Consumers with Deposits." Our readers must know that we have consistently advocated the principle of requiring from every new consumer, rich or poor, a deposit, bearing interest at, say, four or five per cent. If this had been done as soon as Gas Companies were firmly settled as monopolies, we should not have heard of auction clauses or the sliding scale. The interests of consumer and company would have been identical, and the undertaking would have been, in the main, a co-operative concern. We are astonished that any one in canny Scotland should see an objection to the rigid exaction of deposits. There might, of course, be difficulties now in charging them on the old consumers who had regularly paid their accounts; but a little explanation on the part of the collector would soon set the matter in its true light before the consumer. We were astonished to see some persons (are they connected with a Gas Company?) arguing that deposits involved a great hardship on the poor, and that discounts would be far more to their advantage. The simple fact is, or, rather, may be, that if Donald deposits 10s., which he can well afford, he will have accruing to him at the gas office an interest twice as much as that which is paid by the savings bank; whereas, if he took a little small change, in the way of discount, when he paid his account, it would be just as likely to go to the *whuskey* shop as to stay in his pocket. It is, however, as somebody said in the discussion, not the business of Gas Companies to teach the practice of thrift.

The award of Sir H. Hunt in the case of the purchase of a portion of the Birmingham gas undertaking, by the Commissioners of West Bromwich, has, as a matter of course, given great dissatisfaction to the Corporation, who, on Saturday last, made an application to the Court of Queen's Bench to quash the award. We doubt whether any advantage will be attained by such a step, other than the result of adding to the law charges which the ratepayers will have to satisfy. If the case, as now put, should not be considered as *sub judice*, we might express a very strong opinion that West Bromwich is perfectly right in contending that they should buy from the Corporation of Birmingham at exactly the same rate as the Corporation bought from the Birmingham and Staffordshire Gas Company; in fact, to our minds, the Bills of the outlying Local Authorities obviously invited an equitable division of the property of the undertaking on fair terms. That the Corporation of Birmingham should make half a million by cutting up the undertaking of the Gas Company into four portions, could not for a moment be allowed; but we must refrain from further comment.

Dr. Whitmore, Gas Examiner for the Vestry of Marylebone, reports very favourably of the quality of the gas supplied to the Parish during the past year. Without being in the least degree disrespectful, we may say he could not do otherwise. We know the quality of the gas which is sent out from every station in the Metropolis; and, as regards the Companies under obligation to supply sixteen-candle gas, we know they fulfil all the statutory requirements. Of course, the illuminating power of the gas may fall for a short time, but Dr. Whitmore cannot point out any instance in which a supply below the statutory requirement was continued.

There are many people who would like to have a concise and clear account of the history, science, and art of the manufacture of coal gas. Such a book is now offered to them by Mr. S. Hunter, of Salford, who has republished, in pamphlet form, a lecture on gas which he delivered at the request of the Corporation of Salford. We can recommend the *brochure* to the perusal of those who desire a short and popular account of gas. It may be useful to others who wish to have an accurate knowledge of the circumstances and time under which the Police Commissioners, as they were then called, became possessed of the gas undertakings of Salford and Manchester. Curiously enough, Salford preceded Manchester in what must be called the acquisition of a gas undertaking; but never succeeded, for reasons easily understood, in making the present development of gas industry a source of large public profit. Mr. Hunter goes more or less into all the several branches of gas industry. The general manufacturing and distributing plant, meters, and burners all receive attention. In short, the lecture gives an account of gas, which will be read by the general public with pleasure and profit.

ACCOUNTS OF THE METROPOLIS GAS COMPANIES FOR THE YEAR 1877.

—	Chartered.	Commercial.	London.	Phœnix.	South Metropolitan.	Surrey Consumers.	All the Companies.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Capital and borrowed money	8,400,354 0 0	690,217 0 0	864,179 2 6	1,121,000 0 0	480,000 0 0	290,000 0 0	11,845,750 2 6
Income—viz.:							
Sale of gas by meter	1,652,595 13 9	191,399 9 2	192,048 8 5	241,496 3 5	133,294 17 3	77,470 8 4	2,488,305 0 4
Public lights, including lighting and contracts	129,506 15 3	20,300 18 1	19,906 13 7	25,679 5 11	15,941 15 3	14,411 14 9	225,747 2 10
Meter-rents	33,879 6 4	2,550 7 4	4,113 10 6	5,791 16 9	3,190 8 3	2,092 16 7	51,618 5 9
Old materials	4,097 1 11	152 7 0	473 15 6	1,285 11 10	464 0 3	240 0 0	6,713 5 6
Residual products	496,730 13 1	55,572 1 7	61,654 2 6	86,558 8 3	48,844 0 10	24,462 15 8	767,822 1 11
Miscellaneous	5,352 16 11	435 4 8	3,134 19 6	2,495 0 2	419 14 10	362 10 3	12,220 15 4
Total income from all sources	2,322,162 7 3	270,430 7 10	281,331 10 0	357,306 6 4	202,154 16 8	119,041 3 7	3,552,426 11 8
Expenditure—viz.:							
Coals, including carriage and dues	844,831 6 5	109,542 1 5	98,642 19 11	127,260 11 11	74,334 6 11	42,038 17 8	1,296,650 4 3
Purifying materials, including labour	39,720 10 8	7,059 5 0	1,837 15 8	2,770 18 5	3,504 4 7	1,829 12 5	56,722 6 9
Salaries and wages—manufacture	165,653 12 2	26,755 8 5	23,360 13 8	26,723 7 6	19,266 17 6	10,809 11 3	272,569 10 6
Wear and tear—maintenance	223,049 19 3	22,741 2 4	27,404 3 11	52,678 14 6	13,387 11 5	15,026 18 2	354,288 9 7
Rents, rates and taxes	64,296 18 1	6,002 7 8	16,088 14 5	9,654 9 6	4,898 17 9	4,102 15 7	99,044 3 2
Salaries—management	10,801 11 1	1,454 13 0	2,397 13 11	2,354 1 1	1,741 10 5	1,148 16 0	19,898 5 6
Collectors commission	24,656 14 1	2,139 4 4	3,157 19 10	4,611 13 11	2,305 11 1	975 0 1	37,846 3 4
Stationery, printing, and general charges	12,569 3 10	1,595 14 7	1,727 2 0	2,277 1 4	1,350 1 1	837 1 5	20,386 4 3
Directors	7,500 0 0	3,200 0 0	1,975 0 0	2,500 0 0	1,200 0 0	2,000 0 0	18,375 0 0
Auditors	1,306 5 0	250 0 0	150 0 0	100 0 0	100 0 0	105 0 0	2,011 5 0
Salaries and wages, wear and tear—distribution	105,295 11 0	13,654 3 9	18,510 8 3	22,404 14 5	10,703 1 2	7,761 15 8	178,309 14 3
Repair and renewal of meters	32,034 4 1	2,046 17 8	3,114 3 1	4,297 15 2	2,062 12 7	1,066 3 4	44,621 15 11
Law and parliamentary charges	10,142 12 10	439 14 0	316 1 0	257 1 0	44 2 4	43 15 6	11,243 6 8
Bad debts and extraordinary expenses	28,478 2 5	1,615 10 5	10,854 15 3*	2,555 17 4	1,752 4 2	911 16 6	46,168 4 1
Total expenditure on revenue account	1,570,336 10 11	198,476 2 7	203,537 8 11	260,446 6 3	136,681 1 0	88,657 3 7	2,458,134 13 3
Gross profit	751,825 16 4	71,954 5 3	77,794 1 1	96,860 0 1	65,473 15 8	30,384 0 0	1,094,291 18 5
Do. per cent. on capital and borrowed money	8 19 0	10 8 6	9 0 6	8 1 3	13 12 10	10 9 6	9 4 9
Do. do. gas-rental	42 3 9	33 19 9	36 14 0	36 5 0	43 17 5	38 1 4	40 6 5

* This item includes the sum of £8,920 18s. 11d. paid to the Chartered Company for cannel gas supplied in bulk.

TABLE *showing the Capital, Income, Expenditure, and Profit per Ton of Coal carbonized in* 1877.

—	Chartered.	Commercial.	London.	Phœnix.	South Metropolitan.	Surrey Consumers.	Mean of all the Companies.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Capital and borrowed money	7 19 9·66	5 8 5·58	7 1 9·63	6 17 1·72	4 15 8·14	5 16 1·28	7 6 9·18
Income—viz.:							
Total gas-rental	1 13 10·83	1 13 3·21	1 14 9·35	1 12 8·23	1 9 8·96	1 16 9·44	1 13 7·51
Meter-rents	7·73	4·82	8·11	8·50	7·63	10·06	7·67
Old materials	0·94	0·28	0·93	1·88	1·12	1·15	1·00
Residual products	9 5·39	8 8·79	10 1·40	9 10·26	9 8·83	9 9·53	9 6·16
Miscellaneous	1·22	0·86	6·17	3·66	1·00	1·74	1·82
Total income from all sources	2 4 2·11	2 2 5·96	2 6 1·96	2 3 8·53	2 0 3·54	2 7 7·92	2 4 0·16
Expenditure—viz.:							
Coals, including carriage and dues	16 0·86	17 2·57	16 2·23	15 6·83	14 9 80	16 9·97	16 0·78
Purifying materials, including labour	9·07	1 1·31	3·62	4·07	8·38	8·79	8·43
Salaries and wages—manufacture	3 1·82	4 2·45	3 10·00	3 5·24	3 10·09	4 3·94	3 4·53
Wear and tear—manufacture	4 2·92	3 6·88	4 5·96	6 5·34	2 8·02	6 0·20	4 4·67
Rents, rates, and taxes	1 2·68	11·32	1 7·87	1 2·17	11·72	1 7·71	1 2·73
Salaries—management	2·47	2·74	4·72	3·46	4·17	5·52	2·96
Collectors commission	5·63	4·03	6·22	6·77	5·52	4·68	5·63
Stationery, printing, and general charges	2·87	3·01	3·40	3·34	3·30	4·03	3·03
Directors	1·71	6·03	3·89	3·67	2·87	9·61	2·73
Auditors	0·30	0·48	0·30	0·15	0·24	0·50	0·30
Salaries and wages, wear and tear—distribution	2 0·03	2 1·71	3 0·45	2 3·89	2 1·60	3 1·29	2 2·51
Repair and renewal of meters	7·31	5·86	6·13	6·31	4·93	5·12	6·63
Law and parliamentary charges	2·31	0·83	0·62	0·38	0·10	0·21	1·67
Bad debts and extraordinary expenses	6·50	3·05	1 9·37	5·71	4·19	4·38	6.86
Total expenditure on revenue account	1 9 10·48	1 11 2·27	1 13 4·78	1 11 10·33	1 7 2·93	1 15 5·95	1 10 5·46
Gross profit	14 3·63	11 3·69	12 9·18	11 10·20	13 0·61	12 1·97	13 6·70

TABLE *showing Increase or Decrease in each Item during* 1877 *compared with* 1876.

—	Chartered.		Commercial.		London.		Phœnix.		South Metropolitan.		Surrey Consumers.		All the Companies.	
	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.
	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Capital and borrowed money	298,868	..	62,909	..	26,849	..	66,000	..	20,000	..	..	..	474,626	..
Income—viz.:														
Sale of gas by meter	..	21,256	753	..	1,092	..	11,647	..	11,657	..	3,088	..	7,881	..
Public lights, including lighting and contracts	..	6,263	296	..	..	1,284	655	..	1,347	..	..	25	..	5,275
Meter-rents	1,183	..	1,915	..	108	..	270	..	2,413	..	27	..	5,917	..
Old materials	..	1,825	..	206	229	..	..	105	213	..	102	..	..	1,502
Residual products	..	43,364	..	2,797	..	5,327	2,780	..	..	4,275	142	..	..	52,842
Miscellaneous	..	161	..	163	89	..	28	..	118	..	134	..	46	..
Total income from all sources	..	71,626	..	202	..	5,093	15,275	..	11,473	..	4,458	..	..	45,775
Expenditure—viz.:														
Coals, including carriage and dues	..	29,538	..	558	1,515	..	..	2,721	..	2,104	1,860	..	..	31,845
Purifying materials, including labour	..	5,122	2,695	..	..	488	562	..	378	..	749	..	..	1,225
Salaries and wages—manufacture	5,482	..	639	..	..	732	2,847	..	828	..	859	..	9,923	..
Wear and tear—manufacture	19,432	..	..	18,351	..	4,610	5,824	..	..	6,229	5,330	..	1,396	..
Rents, rates, and taxes	4,978	..	721	..	1,033	..	..	377	219	..	390	..	6,964	..
Salaries—management	..	1,198	49	..	23	..	29	..	242	..	..	2	..	855
Collectors commission	..	323	108	..	127	..	429	..	280	..	5	..	628	..
Stationery, printing, and general charges	151	..	..	130	252	..	236	..	346	..	72	..	926	..
Directors	..	800	..	..	175	..	..	..	..	..	..	..	..	625
Auditors	646	..	69	..	..	..	..	..	..	..	..	..	715	..
Salaries and wages, wear and tear—distribution	6,489	..	..	971	2,931	..	3,059	..	..	761	..	1,256	9,499	..
Repair and renewal of meters	..	2,893	746	..	65	..	152	..	..	363	..	384	..	2,678
Law and parliamentary charges	2,957	..	179	..	..	708	..	1,125	..	2,098	..	802	..	1,596
Bad debts and extraordinary expenses	..	6,820	..	1,843	..	4,134	355	..	319	..	..	3,020	..	15,143
Total expenditure on revenue account	..	6,359	..	16,647	..	4,749	9,270	..	..	8,945	3,804	..	..	23,625
Gross profit	..	65,327	16,445	..	..	344	6,005	..	20,416	..	654	..	..	22,150
Do. per cent. on capital and borrowed money	..	1·14	1·57	..	..	0·33	..	0·55	3·84	..	0·22	..	..	0·49
Do. do. gas-rental	..	2·97	7·64	..	..	0·13	..	0·60	10·79	..	0·75	..	..	0·48

Water and Sanitary Notes.

The Metropolitan Board of Works have renewed the notice they gave for the promotion of the Bill, which was introduced by them last session, to acquire, by compulsory purchase, the undertakings of the Metropolitan Water Companies. That any body of gentlemen should repeat, at the ratepayers expense, the proceedings of last year, when it may be taken as certain that they will be abortive as heretofore, is to us most surprising. It indicates, to our minds, a callousness, and an indifference to the interests of their constituents, which we should not have expected, if it did not emanate from men who have practically no responsibility whatever. Until the Metropolitan ratepayer is made fully aware of the fact that he—poor man!—has no control over the money which he pays out of his pocket; and which goes, at the bidding of those who, by an extraordinary figure of speech, are called his representatives, into the hands of the barristers and engineers whom they may choose to patronize, and into goodness knows how many other channels—will anything be done to control this wasteful expenditure. As said elsewhere, little may be effected, we cannot say next session, but in that which must follow. However, nothing need be said on this score until we know more about the intentions of the Government. We content ourselves with once more protesting against this reckless squandering of public money in proceedings which can never bear useful results.

The first ordinary meeting of the Society of Arts for this session was signalized by the delivery of an address from the Chairman, Lord Alfred Churchill. He dwelt at considerable length on the subjects of water supply, drainage, and the pollution of rivers, and suggested the necessity for a compilation, which would gather "into one focus all the information already accumulated in reference to these various matters, but buried, so to speak, in Blue-books and other stores of information; and, where needed, seek, by necessary surveys and examinations, such further information as may be required from time to time to supplement what is already known." Blue-books are, perhaps, compiled on the worst possible system. They are, in most instances, published solely in the interests of paper-makers and printers, not to mention offensively the members of our Legislature, who obtain them for nothing, and dispose of them at 18s. per hundredweight. It would be highly desirable, if it were possible of accomplishment, that, instead of the style of book now issued, we could have condensed statements of the evidence delivered. There may be much in the testimony of Mr. A., and also of Mr. Z.; but an ordinary reader finds it impossible to wade through the thirty or forty folio pages in which their opinions are displayed. But in this there is, no doubt, some difficulty. If Committees, who gape and lounge, and show every sign of weariness while expert witnesses are being examined and subsequently badgered, will not take the trouble to give a clear, concise, and definite digest of the evidence, we do not know who is to do it. The Committee Clerk obviously could not do it—all his energies are exhausted in occasionally administering an oath. Thus the shorthand writers and the printers have it all their own way. John Bull is bewildered, pays his money, and is left no choice.

We pass to the question of the connection of house-drains with sewers. Doubtless much of this work, particularly near the houses, has been very badly done; but can any sane man believe that so much mischief as is alleged results from untrapped and badly-ventilated drains? Probably not one house in a thousand in this Metropolis has its drainage appliances in what some would call perfect order, but the Metropolis is still inhabited. The sanitarian from New Zealand, who investigates the nature of the sanitary arrangements of our City when it is reduced to the condition of Nineveh and Babylon, will probably be astonished at the apparatus he will find, and wonder at the depopulation.

What may be called the final meeting of the Exeter Water Company took place on the 12th inst, when the affairs were so far wound up that only a balance of about £350 was left to be distributed among the Committee of Management, if the sum should be in existence eighteen months hence. At the present moment the Shareholders get the ordinary six per cent. dividend and a bonus besides of £1 per share; thus, when they have received the £47 per share, their interest in the concern entirely ceases. But what about the citizens of Exeter? What is the quality of the water the Corporation intend to supply? Where are the new sources of supply to be, which it was urged were so necessary for the health of the city? The much polluted Exe will, no doubt, continue for years to come to furnish water to the citizens of Exeter, and no one will be the better or the worse for it; and as the Shareholders of the Water Company have been fairly well paid for their property, we have no objections to make.

There can be no doubt, at the present moment, that the west-end section of the City of London is very inadequately protected from fire; but we shall say nothing more about it, since the Metropolitan Board of Works seem anxious to repair the error they made when they removed the fire-engine station from Farringdon Street to Southwark Bridge Road. They can find premises in Farringdon Street, at present, in which they can place a new station; but, then, money will have been sacrificed by the abandonment of one station, which ought never to have been left, and the institution of another, which may not be required when the City is well supplied with hydrants.

Earl Derby, following in the footsteps of his father, is doing his best to suppress noxious vapours from chemical works. He is, of course, a landlord, and, like all those who accompanied him on the occasion of his interview with the Right Hon. G. Sclater-Booth, spoke in a landlord's interest. We are very sorry that the condition of the country around St. Helen's and Widnes should be as it is, but we may just as well change the picture. Suppose St. Helen's and Widnes transformed into rural paradises, what would be gained? Some apples and gooseberries; but what would become of the teeming population who are now earning liberal wages from the neighbouring chemical works, which unquestionably are detrimental to vegetation, just as chemical refuse is to salmon rivers into which it enters. It is simply a question of salmon *versus* profitable industrial work, and grass and apples against alkali and sulphuric acid works. We agree with Lord Derby, however, that the pollution of the atmosphere by acid vapours should be kept down to the minimum. Rigid inspection, which the law now imposes, is perfectly sufficient for all present purposes. No further legislation is necessary. So long as chemical works exist, let the best possible means of condensation be in operation, gardens will not flourish around them.

The Burnley Corporation have confessedly "outrun the constable," and now they have thought of applying to Parliament for power to borrow something like £160,000. They appear to have nothing that pays them but the gas undertaking, all their other ventures seeming to be losing concerns. It is now proposed to convert all the borrowed money into consolidated stock; but, apparently, a majority of the Council do not agree either to effect the additional loan, or make the conversion, and the matter stands over for another year. In the meantime, it may be hoped that a Burgess will spring up, who will be able to put the finances of the Burnley Corporation into order.

No matter wherever you propose to put a sewage farm, the institution is certain to excite opposition. That a sewage farm in the genteel neighbourhood of East Molesey should be regarded with disgust, is not at all surprising. It will be the same wherever the Joint Drainage Board of the Lower Thames Valley propose to establish a farm or a filtering-ground, so they had better be firm at once. If it be true—and we will take Lieut.-Col. Haywood's word for it—that the ground selected at East Molesey is eminently fitted for an irrigation farm, that is the spot which the Joint Drainage Board should use all their influence to secure. At any site they may go to they will have to encounter the same dogged and unreasonable opposition. As far as we can see, the Joint Board have an excellent case to go before Parliament with; and, notwithstanding the opposition of Serjeants-at-law and Q.C.'s, we believe the Board will carry their proposed scheme. Parliament always looks with favour on an original and well-devised plan, and unless something more tangible can be brought forward than was alleged at a recent "indignation meeting" at East Molesey, Lieut.-Col. Haywood's proposal is certain to be carried.

Rochdale and the neighbourhood are confessedly difficult localities to sewer. Rochdale itself is, for the most part, well served on the pail system, but there are a considerable number of water-closets in the town, and there is storm water, which has hitherto been sent into the Roach. Action, however, has been taken against the Town Council, apparently by a gentleman who has land to sell, for which he hopes to obtain a fancy price. The Town Council have appealed to the Local Government Board for time. Their proposal is to carry the sewage into tanks, and there treat it with lime, afterwards allowing the effluents to flow over twenty-six acres of land, and then pass into the river. The scheme looks to us extremely reasonable, but Mr. Thornhill Harrison, Local Government Board Inspector, wishes for a far more extensive area on which to carry out what he calls the "purification" of sewage. Sewage, it must be understood, cannot be purified—that is to say, it cannot be converted into pure water. Do what you will with it, animal matter it will retain in solution; but this is not necessarily noxious. On the contrary, it may even be useful in a stream. So far as we can see, the

scheme propounded by the Corporation is a very sensible one, and we cannot understand why the Central Authority should raise any objection to its being carried out.

THE ELECTRIC LIGHT.

At least eight forms of the electric light present themselves for notice, and others are seeking to struggle out of the embryo condition. Thus the names of Jablochkoff, Werdermann, Siemens, Rapieff, Lontin, Wallace, Harrison, and Sawyer, come before us, while among those who promise to make an appearance we have Edison, Arnaud, and others. To reckon up all the inventors, *in esse* and *in posse*, is more than we can undertake. Amid this galaxy of electric lights there are stars possessing various orders of magnitude, and for the present moment the brightest appears to be that of Werdermann. The Jablochkoff light, being in a more advanced and practical stage than the Werdermann, naturally attracts greater notice from the public; but the Werdermann system is that upon which the Gas Companies are likely to fix their attention, and which, on certain grounds, more directly threatens them, if it can be said that the Gas Companies are threatened by any form of the electric light. The forms are various, to an extent which must soon perplex the public. The positions in which the carbon electrodes are placed seem almost to exhaust the catalogue of possibilities. Let the reader take a pencil and draw two vertical strokes side by side. That is the Jablochkoff arrangement. Let him draw one vertical stroke, and then place a short horizontal stroke across the top of it, making something like the letter T. That is the Werdermann. Let him take the two vertical strokes of the Jablochkoff and place them one above the other. That is the Siemens and the Serrin. Let him draw two strokes at an angle with each other, so as to resemble the letter V. Then let him draw two more strokes like a letter V upside down. Let him place these in such wise that they shall form the letter X, except that there is a small space in the centre, and one V is twisted round at right angles to the other. That will be the Rapieff. Or let him take the inverted V, and draw a vertical stroke above it, so as to make something like the letter Y upside down, and that will be M. Rapieff's latest device. Yet again, let the reader draw two parallel strokes horizontally, and he will have the Wallace lamp. Even this does not end the story. Let him take the pencil, and, starting from a point, let him trace a species of spiral. This may answer for the flexible carbon of Mr. Harrison. Other little puzzles may be sketched out, in which circles and straight lines—that is to say, discs and rods—are made to assume different positions towards each other. Electrodes may also vary in their relative proportions. Jablochkoff has both the same size, with a strip of kaolin or plaster of Paris between. Werdermann gives the negative electrode a sectional area sixty-four times that of the positive. Mr. Sawyer, of New York, puts his electrodes into a sealed receiver. Edison has no carbon at all, but is credited with the use of platinum. Other devices will doubtless follow, and the electric light will be conjured up in an endless diversity of ways, each inventor having faith in his own peculiar system. The electric current itself varies. It may be continuous, or alternating; it may be characterized by quantity or by intensity; it may be obtained from a Gramme, a Lontin, a Wallace, or other machine; and the machine may be driven by a steam-engine, a gas-engine, or by a turbine moved by water-power, according to the plan of Sir William Armstrong, at Cragside, in Northumberland. Electricity is everywhere, though we must work to get it, and work means money, for the sake of wages and capital, wear-and-tear and interest, working expenses and the like.

The electric light dawns upon us in an age of science and invention. Thousands of busy hands and ingenious brains are ready at once to seize upon it and develop its latent power. Gas, as a source of illumination, had its birth when the world was not as it is now. Science was less advanced, and men of great technical skill were few. There is a tendency to run in grooves, and although the modes of manufacture and supply in respect to gas have undergone improvement, we believe that gas has not yet received due honour, even from its best friends. A closer acquaintance is necessary between the Gas Companies and the consumers. It will no longer answer the purpose to send gas along the mains for the consumer to burn according to his own ignorance. The shifts and stratagems by which the consumer seeks to get light out of gas while burning as little as possible, have the effect of damaging both parties—the consumer and the producer. Just as the householder has wholesome water pouring into his tank or cistern, and foul water running out of it, so the gas consumer has sixteen-candle gas passing through his meter, and something like ten-candle gas burning in his lamp. Cannot the Gas Companies help him? We think they might—or, rather, we now think they must. From a huckstering point of view, it is not to the interest of the Company to show the consumer how to get more light out of his gas. But a broad and honest policy will soon apprehend that the Companies will do themselves an immense service if they will teach the public not to waste the commodity. The use of gas requires to be popularized. There is no need to make the gas of higher lighting power than sixteen candles. But if this could be supplied at a lower price, such a step would be very acceptable. In London, a general amalgamation of the Companies would bring this to pass, supposing no disturbing cause to intervene. We believe it is expected by parties who are very well able to judge of the probabilities in respect to gas, that the supply in London will soon be brought down even below its present moderate price. The Gas Companies have weapons at their command, if they will but use them. Those weapons are—enterprise, science, and economy.

It may be well that the Gas Companies throughout the kingdom should hold themselves in readiness to supply the electric light; but they must not allow their attention to be called off from that real and immediate work which lies before them. The electric light has its difficulties to conquer, which will require an enormous amount of energy and resource. It is comparatively easy to kindle a great light, and so to dazzle the eyes of a multitude. The latter hardly care to think at present what the light costs, or whether it can be made available for common use. There is just one little difficulty, which may appear ridiculously small, but which must be got over in some way, though the mode of doing so is not yet clear. When carbon electrodes are exposed to the air, and are emitting light, it will happen, at uncertain intervals, that particles of carbon, of very appreciable size, and in an alarming state of incandescence, will fly off from the lamp or regulator, and descend on the floor. This would be fatal to a handsome carpet, and highly perilous to ladies dresses. We have been present at trials of the electric light at which the fiery shower has been anything but agreeable. But, beyond this, there are certain other obstacles, of a somewhat recondite nature, which call for careful consideration. So far as volume is concerned, the electric light is most economical when produced on a large scale. If a given horse power applied to a dynamo-electric machine will produce the light of three thousand candles, this light is produced most cheaply when it is all concentrated in one lamp. But as the illuminating effect of a light diminishes according to the increase in the square of the distance, the concentrated light is placed at a disadvantage. If, in order to remedy this evil, the electric current is divided so as to supply a plurality of lamps, there is immediately a falling off in the aggregate illuminating power, and the greater the division the greater the loss. This principle holds good in all cases, though the degree of loss may vary according to the system employed. Thus, Mr. Werdermann can give two lights of three hundred and twenty candles each; but when he divides the current so as to give ten lights, these are only equal to forty candles each (perhaps less), or an aggregate of four hundred instead of six hundred and forty. Another drawback consists in the shading of the light when produced with any intensity. An opalescent globe, it is reckoned, will cut off fifty or sixty per cent. of the light. Mr. Sugg's combined reflector and transmitter, shown at the offices of the Chartered Company in the Horseferry Road, Westminster, a few days ago, was estimated as intercepting about thirty per cent. of the light, thereby reducing the one thousand five hundred or two thousand candles to one thousand or one thousand three hundred candles. Mr. Werdermann dispenses with the use of any shade, except a globe of plain glass, which intercepts only about ten per cent. of the light. This is practicable in Mr. Werdermann's case, seeing that he brings down the light to a low degree of intensity. Another drawback in the use of the electric light consists in the loss of power in the transmission of the current, according to the distance intervening between the machine and the light. What may be termed the waste or absorption of the current along any considerable length of wire, is such as to forbid the transmission of the current to any great distance. The current has to work its way along the wire, and expends some part of its energy in doing this work. The resistance increases more rapidly than the distance, and the light at the far end is diminished accordingly. Gas may be sent along the mains from Beckton to Westminster—a distance of a dozen miles or more—without perceptible loss of lighting power, but there is no prospect of an electrical Beckton. Gas also possesses an advantage over electricity in that it admits of being stored. The electric current flows only so long as the machine is at work. The work of the machine must cease when the light is not wanted, and when the light is again required there may possibly be some difficulty in getting the machine to work again with sufficient

promptitude. Perhaps Mr. Edison will invent a plan for storing the electric current, just as he has declared his ability to raise and lower the electric light without wasting the current or disturbing contiguous lights. Mr. Edison has promised to transmit the current without material diminution on account of distance. But Mr. Edison may be misreported, or he may be over-sanguine, and we are very well sure that he cannot overcome the laws of Nature. His "entirely new point of departure" may be very clever, but it may prove, like the phonograph, more curious than useful.

An apology for the real division of the electric current is afforded by placing several circuits on one machine. Thus the twenty Jablochkoff lights on the Thames Embankment will be sustained from one machine having four circuits, each circuit carrying five lights. A marked feature in the Jablochkoff light is the short duration of the candle—namely, a little more than an hour. An attendant must be on the alert to go round and move the switch of a commutator so as to change the course of the current in the lamp, in order to light up a fresh candle. Automatic arrangements may ultimately take the place of this awkward manual device; but at present there seems little prospect of such a change. In the Siemens lamp, the carbon lasts about three hours, and the Lontin will be the same. In the Wallace lamp, the carbons being plates or bars of considerable size, the electrodes will last one hundred hours. But so far as we have seen the Wallace lamp in action, it is what we may call a "fidgety" light, sputtering and darting about from one end of the horizontal bars to the other, and varying much in colour. Mr. Ladd is improving the lamp, and we shall see the result in lighting up part of the Liverpool Street Railway Station. Mr. Rapieff has long carbons, which last a good many hours. He also prolongs the period by distributing the combustion among four, or at least three, rods in each lamp. What Mr. Harrison may do with his flexible carbon remains to be seen. M. Arnaud has been dividing the current rather than making a lamp. Herr Krupp should also be mentioned. Having manufactured his own gas, this celebrated maker of guns is now setting up his own electric light, having patented a lamp for the purpose, and getting his current from a dynamo-electric machine—we presume a Gramme—driven by the shafting which works the appliances of the factory. We are informed that the quality of the light is extremely good, so as to render it quite possible, by means of its aid, to carry out all examinations of rails and other articles requiring inspection. Herr Krupp estimates the cost at about five-eighths that of gas. What gas costs him, we have not yet learned; and it is evident, although the extra cost of engine-power is not appreciable in so enormous an establishment as that at Essen, that it must amount to something, and will become apparent when Herr Krupp carries out his proposed extension of the light to other parts of his factory. As already intimated, Sir W. Armstrong is getting an electric current by water-power through the intervention of a turbine, using the current to illuminate his picture gallery. The distance the current traverses—a mile and a half—is extraordinary; but the loss of power must be very great. Still, there is a large available balance, and Sir William is going to use this for mechanical purposes, as well as for the production of light, so as to get more work out of his electrical plant, and, therefore, a better return for his outlay.

Mr. Werdermann's mode of dividing the current seems closely akin to that of Mr. Edison's. There is nothing, so far as we can see, to prevent Mr. Werdermann from laying on the electric light to a row of houses after the manner which Edison is said to contemplate. In fact, we believe that an exhibition of the Werdermann light to illustrate this principle will shortly be made. That which remains to be learned is the consumption of power in this form of the electric light. We apprehend that it is very large, although it is true that a current of low tension is employed. It is thought possible to generate the current by a galvanic battery in those cases where many lights are not wanted. In this way it is deemed practicable to light up an office or a shop of moderate size. But the success of such an effort may be doubted, and the idea at present is little more than a theory, though experiments are going on for the purpose of testing it. On the whole, we see nothing which ought to create alarm in the minds of those parties who hold shares in British Gas Companies. The absence of any panic in New York is significant, and Mr. Edison himself is so far feeling the difficulties of his enterprise as to hesitate in asserting that he can produce the electric light at a cheaper rate than gas, except in countries where gas is very much dearer than in England. The end of the whole matter we believe to be this—that the electric light is destined to do something which gas cannot do, and will be found unable to do that which gas has hitherto performed. Electricity will kindle lights few and large, while gas will have its jets comparatively small and multitudinous. Electricity and gas will each have a sphere of its own, like the locomotive and the horse.

Correspondence.

[*We do not hold ourselves responsible for the opinions expressed by Correspondents.*]

THE CONFERENCE ON THE ELECTRIC LIGHT.

SIR,—In your report of the Gas and Water Association meeting at the Westminster Palace Hotel last week, I am made to express an opinion exactly the opposite of that which I hold, and intended to maintain.

I said that the argument used by Dr. Phelps appeared to me to be the only one which could be urged before a parliamentary committee—viz., that gas companies should be put in the same position in regard to the new light as any private adventurer or company, and enabled to supply it if they thought fit, but without any special privileges. At the same time, I said that in my humble opinion it was unnecessary and unwise to ask even these powers. Our legitimate business is amply sufficient, and will remain sufficient, to occupy all our energies in its development; and, for what demand there may be for the electric light, the public would hardly make application to the gas companies, whose rival it is supposed to be.

CORBET WOODALL.

Phœnix Gaslight Company, Vauxhall, S.E., Nov. 22, 1878.

THE GAS SUPPLY OF BOLTON.

SIR,—I am not quite certain that the decrease in the quantity of gas manufactured in Bolton during the year ending the 30th of June last is to be attributed wholly to bad trade, as you surmised in your "Circular to Gas Companies" of the 19th inst.; or, how is it that since the 1st of July last our make of gas has increased 6 per cent. over the corresponding period of last year? And this year trade is more depressed than it was last.

Although bad trade may be credited (or, shall I say, discredited) with a check in the supply of gas, yet I consider the main reason—and it is an instructive one—to be due to the fact that the illuminating quality of the gas supplied was increased from 16 to 18 candles in the year in question. We are now supplying a quality similar to that of last year, and, as I have stated, an increased quantity of 6 per cent.

Gas Offices, Bolton, Nov. 21, 1878. HARRISON VEEVERS.

BURNERS AND GAS-STOVES.

SIR,—In your "Circular to Gas Companies" last week, speaking on this subject, you say—

"Then comes the important question of burners, which the Company now propose to supply. They have at command the best burners possible for the consumption of their gas to the greatest advantage. On this score we need only say that careful supervision will remove the cause of all the complaints which now prevail. It is admitted by all who know anything about the matter, that a vast majority of complaints of bad gas arise in consequence of the use of burners ill-adapted for the consumption of London gas."

This I can vouch for as a fact, and in my Inaugural Address as President of the British Association of Gas Managers, in June, 1870, I refer at length to the subject. I state—

"The consumers have been in the habit of wasting the gas supplied to them, and throwing away very large sums annually, by the use of shamefully bad burners. . . . At the same time, let me point out to gas managers that it is their duty to assist consumers to a selection of burners. For years past I have done this, and we recommend the steatite burner and the slit fishtail as far preferable to the two-hole fishtail," &c.

From these two quotations you will see that I, on behalf of this Company, have always had the subject of burners before the gas consumers. These fact were embodied in a pamphlet on "Gas Cooking and Heating," and every consumer was presented with a copy; and a large sum has from time to time been spent on burners for the consumers, to prove to them what we told them as to the defect in their burners. The consequence is, that in the district supplied by this Company, the consumers are well up in the question of burners, and, I believe, are as well supplied as any place lighted with gas; but I tell you for a fact that I have often found, after supplying consumers with burners, and leaving them with good lights, that in the course of a few months, on complaint being again made of bad light, we have found that our burners have been removed, and the old ones refixed; and the reason given was that we had put the new burners on to increase the consumption of gas, that they found their gas bills higher; and on reference, we found they were to the extent of a few shillings only a quarter, although they had certainly double, and in many cases more than double the amount of light they had before. We have, however, been "pegging away," and continue to do so, finding it conducive to the interests of the Company as well as the comfort of the consumers.

I simply point this out as one of the little difficulties to be looked after and overcome. We now take the old burners away.

MAGNUS OHREN.

Crystal Palace District Gas Company, Sydenham, S.E., Nov. 21, 1878.

P.S.—We have, in addition to a very large number of gas-stoves and other apparatus at work in our district the property of the consumers, nearly 600 stoves, at rent, the property of this Company.—M. O.

THE WERDERMANN ELECTRIC LIGHT.

SIR,—In your report of the inspection of the Werdermann system of electric lighting by the Southern District Association of Gas Engineers, the statement is made that Mr. Werdermann "showed the current first divided into two lights of 350 candles each, and then the same current divided into ten lights of 40 candles each."

This corresponds with the ordinary newspaper reports; but the publication in your JOURNAL of the same statement will give it an authority which it had previously lacked, for it will be assumed that the JOURNAL,

and the 30 or 40 gas men present at the exhibition of the light, accept that statement as correct.

When the two larger lights were put into operation, Mr. Wood, of Hastings, and Mr. Baker, of Reading, were standing with me just under the lights, and we all three exclaimed, in one breath, "There is no 300 candles here." Mr. Werdermann, hearing the remark, immediately replied: "No; about 150 to 200 candles." The smaller lights were far below 40 candles; but the power of the lights has not been tested; it is, therefore, guesswork only.

To produce this light, the 8-horse engine of the establishment was employed; and, excepting the shafting, there was no work upon it. Mr. Charles Horsley ascertained the steam pressure to be 45 lbs.; the length of stroke not less than 18 inches; and the diameter of the cylinder quite 8 inches; while the number of revolutions per minute was 96.

The light was beautifully steady; but, when the two large lights were in action, the JOURNAL could not be read with comfort at a distance of 12 yards.

The gas men present were very cheerful at the prospect of extinction, the general expression being that gas had nothing to fear from the Werdermann light, though they certainly thought it the best electric light they had seen.

For my part I am quite content with gas, and hold strongly to the opinion that Gas Companies should confine themselves strictly to the improvement of the manufacture, and to the development of the use of gas, which is the best means of securing their property against any and all attacks that may be made upon it. I have no doubt whatever that our business will continue to grow and prosper.

GEORGE LIVESEY.

South Metropolitan Gaslight and Coke Company,
589, Old Kent Road, S.E., Nov. 22, 1878.

THE USE OF GALVANIZED WROUGHT-IRON SERVICE-PIPES.

SIR,—In your Treatise on the Science of Gas Manufacture, chap. cxxxii., "Service-pipes," JOURNAL, Vol. XXIX., p. 619, you say (speaking of wrought-iron pipes): "In all such circumstances, it is of advantage to employ galvanized pipe, and that, too, of a strength greater than is otherwise necessary."

Our late Engineer, acting upon this, in July, 1877, advised the order of a large supply of galvanized iron-service pipes and connections. These are now to hand, but are rejected as unsuitable for gas by the present Engineer.

You would oblige by informing me if the advice given by you as above, applies to service-pipes galvanized outside and inside, or if among gas authorities there is any objection to their use. Ordinary iron service-pipe decays here rapidly, and it is known that galvanized pipe stands much better for water; but for gas it has not yet had time for proof by experiment. The sulphur in our gas is, I believe, about 3·5; ammonia 8 grains per 100 feet.

HENRY MILLS, Secretary.

Rockhampton (Queensland) Gas and Coke Company, Limited, Sept. 6, 1878.

The remark in the Treatise, on the value and utility of galvanized wrought-iron service-pipes for gas, is founded on my own lengthened experience in their use in a hot climate, and the pipes laid in moist, sandy soil, charged with saline matter. The ordinary wrought-iron tube corroded into holes in a very brief space of time, whereas the galvanized iron exhibited little or no trace of decay after years of service.

The coating was resorted to in order to prevent corrosion from the outside; but I do not think that, if coated both inside and outside, there can be any objection to their use, but the contrary.

THOS. NEWBIGGING.

5, Norfolk Street, Manchester, Nov. 22, 1878.

THE AVERAGE METER SYSTEM—A QUERY.

SIR,—Suppose sixty lamps to be fitted each with the same size and description of burner, and situated all in one district, about the same level, where the pressure would be the same on each. The gas being paid for on the average meter system, and five of these lamps being meter lamps, I wish to know if the fact of the gas having to pass through these meters would cause a less quantity to be consumed in those lamps to which they were fitted than in those without meters. I have heard of an argument of this kind being used by a speaker opposed to an average meter contract, the theory being that the meter obstructs the flow of gas; but, having serious doubts of its soundness, would feel much obliged for some reliable information on the subject.

C. T. V. T.

THE ASSESSMENT OF COMPANIES PROPERTY FOR INCOME-TAX.

SIR,—I shall be obliged if you will allow me, through your columns, to draw the attention of Secretaries and others, who may be about to make their annual return of profits for assessment to the income-tax, to clause 12 of the Customs and Inland Revenue Act, 1878.

I enclose copy of the clause in question.

ACCOUNTANT.

"*Provision as to Deduction for Depreciation of Machinery or Plant.*

"12. Notwithstanding any provision to the contrary contained in any Act relating to income-tax, the Commissioners for general or special purposes shall, in assessing the profits or gains of any trade, manufacture, adventure, or concern in the nature of trade, chargeable under schedule D, or the profits of any concern chargeable by reference to the rules of that schedule, allow such deduction as they may think just and reasonable as representing the diminished value, by reason of wear and tear during the year, of any machinery or plant used for the purposes of the concern, and belonging to the person or company by whom the concern is carried on; and for the purpose of this provision, where machinery or plant is let to the person or company by whom the concern is carried on, upon such terms that the person or company is bound to maintain the machinery or plant, and deliver over the same in good condition at the end of the term of the lease, such machinery or plant shall be deemed to belong to such person or company.

"And where any machinery or plant is let upon such terms that the burden of maintaining and restoring the same falls upon the lessor, he shall be entitled, on claim made to the Commissioners for general or special purposes, in the manner prescribed by section 61 of the Act of the fifth and sixth years of Her Majesty's reign, chapter 35, to have repaid to him such a portion of the sum which may have been assessed and charged in respect of the machinery or plant, and deducted by the lessee on payment of the rent, as shall represent the income-tax upon such an amount as the said Commissioners may think just and reasonable, as representing the diminished value by reason of wear and tear of such machinery or plant during the year: Provided that no such claim shall be allowed unless it shall be made within twelve calendar months after the expiration of the year of assessment."

Legal Intelligence.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

TUESDAY, NOV. 19.

(*Sittings in Banco, before Justices* MELLOR *and* MANISTY.)

LEICESTER WATER-WORKS COMPANY *v.* ASSESSMENT COMMITTEE OF BARROW UNION AND OTHERS.

Mr. MEREWETHER, Q.C., on behalf of the plaintiff Company, applied for an order of the Court, calling upon the Assessment Committee of the Barrow Poor Law Union to pay the sum of £372 18s. 9d., the amount and costs of an award taken up by the plaintiffs. He said there had been some dispute as to the assessment of the Leicester Water-Works, and the Assessment Committee said in effect to the plaintiffs, "We will send a surveyor to re-value your property, on condition that you pay the expenses if you are wrong; or, if we are wrong, we will pay the expenses of the re-valuation." Now, it would be contended on the other side that the Assessment Committee were not liable, either as a body or individually; but he would show that the Assessment Committee was a body apart from the Guardians, and had special and separate duties thrown upon them by Act of Parliament. They had, for instance, power to appoint a valuer without the consent of the Overseers, and, therefore, they would have power, and would be liable, to pay any expenditure incurred.

Mr. GRIFFITHS, Q.C., for the defendants, said that the Assessment Committee were acting with the consent of the Guardians of the Union.

Mr. MEREWETHER said that helped his case. But what he contended was that they had power to act without the consent of the Guardians.

Justice MELLOR: I understand that the plaintiffs proceed against a Mr. Nuttall because he is the Chairman of the Assessment Committee.

Mr. MEREWETHER: The result of the award was to relieve the Assessment Committee from perpetual appeals. Sir Henry Hunt, who acted as arbitrator, said the party who lost should pay the costs of the award.

Justice MANISTY: The Guardians hold the fund out of which the Assessment Committee would pay. If plaintiffs had a judgment against the defendants, how would they obtain payment?

Mr. MEREWETHER: We could seize the property of the Assessment Committee, who have an office.

Justice MANISTY: They have no property, and they have no funds.

Mr. MEREWETHER: Under the Act of Parliament, the Assessment Committee have power to grant remuneration for certain work done.

Justice MANISTY: But how would judgment against the Assessment Committee help you when they have no funds?

Mr. MEREWETHER: The Assessment Committee will have to pay the amount of the claim, either as a body or as individuals. The Committee took the benefit of the award by asking for it, and now that it has gone against them they refuse to pay the cost. I contended that, having agreed to an award, they have no power to withdraw from its effect.

Justice MELLOR: You want them to fulfil their part of the bargain?

Mr. MEREWETHER: Yes, my lord. The umpire decided that the Assessment Committee should pay the award. But I claim damages as well as the cost of the arbitration.

Justice MELLOR: It appears that the Guardians consented to the arbitration, that Mr. Nuttall, the Chairman of the Assessment Committee, signed the document agreeing to the arbitration, and, that being so, it seems as if the claim of the plaintiffs should be against the Guardians of the Barrow-upon-Soar Union.

Mr. MEREWETHER: The plaintiffs do not know which body it is that refuses to accept the terms of the award, and thus they are in a difficulty. The last application for the money was in June, 1875, and no application has been made to the Local Government Board for an extension of time to pay the sum due to the plaintiffs, who paid when they took up the award. Mr. Goode, Clerk of the Guardians, is also Clerk of the Assessment Committee.

Justice MELLOR: If judgment be given against the Guardians, would the Statute of Limitations bar the payment of the claim?

Mr. MEREWETHER: The plaintiffs desisted from taking proper legal steps to obtain their money when the Clerk of the Assessment Committee wrote asking them to do so, and promising to apply to the Local Government Board for an extension of time to pay. Under these circumstances, I am afraid the Statute of Limitations would not apply. Again, the action would be as against a man who promised to do a certain thing in order to arrest legal proceedings, and did not act up to his promise. On a previous occasion the Assessment Committee paid part of the claim made against them on judgment being obtained; and, therefore, it may be assumed that they will do so if another judgment be given against them. Mr. Nuttall is clearly liable, under several cases already decided, if the Assessment Committee do not pay.

Justice MELLOR: If we thought that the Guardians were the real debtors, we should be disposed to add them to the suit.

Mr. GRIFFITHS said that the Guardians thought the Assessment Committee, his clients, were the persons who should be sued. The Assessment Committee were sued simply because the plaintiffs could not sue the Guardians, they having left the claim unpaid since January, 1874.

Justice MELLOR: Who appears for the Guardians?

Mr. GRIFFITHS: No one, my lord.

Mr. PITT-LEWIS: I appear for Mr. Nuttall.

Mr. GRIFFITHS, in continuation, said that the Assessment Committee were appointed by the Guardians, but they were not paymasters, and had no power to pay any claim without the consent of the Guardians. Their duties were restricted to ordering certain things to be done in the name of the Guardians. And when an appeal was made against the valuation of an Assessment Committee, the Guardians appointing it were made parties to the suit. All that Assessment Committees had to do was to fix the amount that each parish re-valued should pay as the cost thereof.

The case occupied the greater part of the day, and judgment was deferred.

SATURDAY, NOV. 23.

(*Sittings in Banco, before the* LORD CHIEF JUSTICE *and Baron* HUDDLESTON.)

THE CORPORATION OF BIRMINGHAM *v.* THE WEST BROMWICH IMPROVEMENT COMMISSIONERS.

In this case the ATTORNEY-GENERAL, the SOLICITOR-GENERAL, Mr. MICHAEL, Q.C., and Mr. CHARLES BOWEN (instructed by Messrs. Sharpe and Co.), applied for a rule calling upon the West Bromwich Improvement Commissioners to show cause why the award made in the recent

Birmingham gas arbitration case should not be set aside, or referred back to Sir Henry Hunt.

The ATTORNEY-GENERAL said: In the matter of an arbitration between the Mayor, Aldermen, and Burgesses of the Borough of Birmingham and the West Bromwich Improvement Commissioners, I have to move your lordships for a rule calling upon the West Bromwich Commissioners to show cause why an award, dated Aug. 17, 1878, and made by Sir Henry Hunt, should not be set aside, or referred back to Sir Henry Hunt. I am informed I ought to move against the parties who opposed in the arbitration, and, amongst others, in addition to the West Bromwich Commissioners, the Oldbury Local Board, the Tipton Local Board, and the Smethwick Local Board. I do not know that I need further refer to these parties.

The LORD CHIEF JUSTICE: If you put them into the rule it will be all right.

The ATTORNEY-GENERAL: In the documents which will be handed in, all the information requisite will be given, and the rule can be properly drawn up. In order to enable your lordships to understand the points to which I wish to direct your attention, and which arise on the award made by Sir Henry Hunt, and in the sense in which I intend to impeach it, I must draw your attention to the Birmingham Corporation Gas Act, 1875. I have handed a book to your lordships, which contains that Act. Before that Act was passed, there had been an agreement entered into between the Corporation of Birmingham and the Birmingham Gas Company, under which it was arranged that the Corporation should purchase the undertaking of the Birmingham Gas Company. Birmingham was at that time supplied with gas partly by the Birmingham Gas Company and partly by a company called the Birmingham and Staffordshire Gas Company; and there were two agreements, both bearing date April 17, 1874, one made between the Corporation of Birmingham and the Birmingham Gas Company, and the other made between the Corporation of Birmingham and the Birmingham and Staffordshire Gas Company; and by those agreements it was agreed that the Birmingham Corporation should purchase these two undertakings upon certain terms which were specified in the agreement. The agreements are set out at length in the schedule to this Act of Parliament of 1875; and the Act was passed principally for the purpose of confirming those agreements, and enabling the Birmingham Corporation and the two Companies to carry out those arrangements. I should tell your lordships that the Birmingham and Staffordshire Gas Company supplied gas not only to Birmingham, but also supplied it to certain districts outside Birmingham. They supplied gas to the districts of the West Bromwich Improvement Commissioners, the Smethwick Local Board, the Tipton Local Board, and some other Local Boards, all surrounding them. It was thought that it would be only fair that if the Birmingham Corporation purchased these undertakings of the two Gas Companies, or rather of the Birmingham and Staffordshire Gas Company, that these Boards should, at any future time, or within a reasonable time, have the privilege of purchasing the rights of the Birmingham Corporation within their own districts. For example, the West Bromwich Commissioners, if they wished to purchase the rights of the Birmingham Company or Corporation for supplying gas in the West Bromwich district, together with the mains, pipes, and so forth, they should be at liberty to do so. A clause was therefore inserted in the Act of Parliament (which was afterwards passed), and that clause is section 40, to which I shall refer your lordships. Section 40 is as follows:—"If any local or sanitary authority or authorities within the limits of the supply of the Staffordshire Company shall bring in a Bill, in the next or next succeeding session of Parliament, for the purchase of that portion of the gas undertaking, now of the Staffordshire Company, which is contained within the district of such local or sanitary authority or authorities, save and except the land of the Company and the West Bromwich works, and the main or mains extending therefrom to the borough, by agreement, or, failing agreement, by arbitration under the Companies Clauses Consolidation Act, 1845, then the Corporation shall not oppose such application to Parliament, except on clauses; and in case such Bill shall pass into law, then in case such local or sanitary authority or authorities give notice of their intention to purchase, within two months after the passing of such Act, the Corporation shall sell, and such local or sanitary authority or authorities shall buy, the portion or portions of the said undertaking in the manner hereinbefore mentioned; and one such arbitration shall determine the principle of valuation as between the Corporation and any other authority or authorities within the limits aforesaid." Next comes some proviso with regard to the rights that are to be given. Now, this Bill passed into law, and your lordships will find that the Act confirmed the agreement made in 1874. In due time——

The LORD CHIEF JUSTICE: The Act confirms the agreement?

The ATTORNEY-GENERAL: Yes; and within the time specified in the 40th section, the West Bromwich Commissioners, and, I believe, the other local authorities, applied for Acts of Parliament under the terms of this 40th section, and there were several Acts passed—an Act relating to each of those local authorities. It will be sufficient for me to refer your lordships to the terms of the West Bromwich Act, which your lordships will find at the beginning of page 149—the book in your lordships hands—and which recites the 40th, the 41st, and 42nd sections of the Act. This Act, after reciting the Act to which I have just referred—the Birmingham Corporation Gas Act of 1875—goes on to recite at the bottom of page 151: "Whereas the Commissioners are desirous of purchasing, in accordance with the provisions of the Corporation Act, and it is expedient that they should be enabled to acquire so much of the undertaking of the Corporation as is within their own limits, and, in connection therewith, to erect gas-works, and to light the parish of West Bromwich. . . . And whereas it is expedient that they should be authorized to raise money for that purpose, and certain notices are required by the Act of 1875, which have been given; and it is provided by section 4"—and I had better refer your lordships to that section first—"that this Act shall have the meaning assigned to it—that is to say, the expression 'the whole undertaking' means the undertaking late of the Staffordshire Company, as purchased by the Corporation under the Corporation Act." It is necessary to distinguish that from the other Gas Company, for there were two Companies purchased—the Birmingham Gas Company and the Birmingham and Staffordshire Gas Company. Now, this was only dealing with the Birmingham and Staffordshire undertaking, which was then in the hands of the Corporation. The undertaking means the whole undertaking late of the Staffordshire Company, as purchased by the Corporation under the Corporation Act. Then it provides, in sec. 6, that if, within two months after the passing of the Act, the Commissioners shall give notice to the Corporation of their intention to purchase that portion of the whole undertaking which is contained within the district of the Commissioners—except certain matters with which I need not trouble your lordships—then the Corporation shall sell, and the Commissioners shall buy, such portion of the whole undertaking, except as aforesaid, in manner prescribed by and in accordance with the provisions of the Corporation Act; that is to say, either by agreement, or by arbitration under the Companies Clauses Act, 1845. Then it is important to refer to sec. 8. Your lordships will see that section provides, in carrying out the purchase of the gas undertaking, that the following provisions shall apply. Pass over No. 1 and go to No. 2: "Subject to the provisions of the Corporation Act and this Act, the sale shall comprise all mains, pipes, plant, machinery, apparatus, meters, fittings, implements, and effects situate within the district of the Commissioners, and belonging to the Corporation, together with all the rights, powers, and privileges of the Corporation in relation to the manufacture, sale, and supply of gas within the district of the Commissioners. The sale shall not include any of the books or writings of the Corporation, or any of the office furniture," and so on. Besides dealing with this, besides the mains and pipes, it shall include "all the rights, powers, and privileges of the Corporation in relation to the manufacture, sale, and supply of gas within the district of the Commissioners." If your lordships will look at section 40, you will see the Corporation and the Local Authority—for example, the West Bromwich Improvement Commissioners—are enabled to agree upon the price to be paid, and they are to be at liberty to do so. I just want to call your lordships attention to what they may agree upon. Sec. 40 provides that if the Sanitary Authority obtain a Bill for the purchase of that portion of the gas undertaking, now of the Staffordshire Company, which is contained within the district of West Bromwich, by agreement, or, failing agreement, by arbitration, then they shall do so. What they are entitled to agree upon is the compensation to be paid for the purchase of the subject matter then mentioned in the Act of Parliament; and, if they cannot agree, then, under the Companies Clauses Act, they may have an arbitration to settle the matter of difference—that is to say, the compensation which is to be paid in respect of the purchase of the subject matter described in the Act of Parliament; and if the arbitrators who are appointed by the parties cannot agree, then, according to the Companies Clauses Act, an umpire may be called in to settle the matter upon which the arbitrators could not agree—that is to say, the amount of compensation which is to be paid for the subject matter which is described in the Act of Parliament. Now, the point which arises is this: The Birmingham Corporation having purchased the undertaking of the Birmingham and Staffordshire Gas Company, when that undertaking is handed over to them, the Birmingham Corporation are enabled to work that undertaking, if I may use such a general expression, in a way much more advantageous.

The LORD CHIEF JUSTICE: Which undertaking?

The ATTORNEY-GENERAL: I will call it the Staffordshire Gas Company, leaving out the word "Birmingham." The Birmingham Corporation having purchased the Staffordshire Gas Company, and got it into their own hands, were enabled, for several reasons, some of which I will mention to your lordships, to work the undertaking much more profitably than perhaps the Staffordshire Company could do, they were enabled to supply and manufacture the gas more cheaply than the Staffordshire Gas Company could do. Their Act, and the greater amount of capital at their command, enabled them to do that; and there were other advantages which they had; they were enabled to retain, so to speak, the whole profits which they acquired by the manufacture and sale of gas; whereas the Staffordshire Gas Company were restricted by their Act of Parliament, and could only divide the profits to the extent of 10 per cent. upon one part of the capital, and not more than 7½ per cent. upon the other part of the capital.

The LORD CHIEF JUSTICE: I suppose that was divided amongst proprietors of shares?

The ATTORNEY-GENERAL: The dividends went to the Shareholders; and they could not receive more than 10 per cent. on some shares, and 7½ per cent. on others; the rest had to accumulate, and be applied in the way provided by the Act of Parliament. If the Company realized more than would pay these dividends, then the surplus was to go in reducing the price of gas; but by this Act of Parliament of 1875, no such restrictions are placed upon the Birmingham Corporation; and not only are no restrictions placed upon the Birmingham Corporation, but such restrictions are expressly removed by the 43rd section, and the Birmingham Corporation could, after they had used the undertaking according to the provisions of the Act of Parliament, realize as much profit as they could get, and could apply that profit in the way pointed out by the Act of Parliament; not, of course, for the advantage of the individual members of the Corporation, but for the advantage of the town of Birmingham generally. That being so, of course it is perfectly clear that the undertaking in the hands of the Corporation of Birmingham is more valuable than the undertaking was in the hands of the Staffordshire Gas Company; that is to say, that if you were to consider what the loss to the Corporation of Birmingham would be in being deprived of a portion of the undertaking, it would be greater than the loss to the Staffordshire Gas Company. The West Bromwich Commmissioners and the Birmingham Corporation failed to agree.

The LORD CHIEF JUSTICE: As to the price?

The ATTORNEY-GENERAL: Yes. What the West Bromwich Commissioners wanted to buy, and what they were entitled to buy, was this: They were entitled to take from the Corporation of Birmingham all the mains and pipes and the various apparatus in the district of West Bromwich, and to deprive the Corporation of Birmingham of the right of supplying gas to the inhabitants of West Bromwich. That is what they were entitled to do, and, of course, to take away from the Corporation of Birmingham all the profit which the Corporation were enabled to realized from that part of their undertaking which related to West Bromwich. That is what they were entitled to do, and that is what they proposed to do; and not being able to agree upon the compensation which should be paid for the loss which the Corporation of Birmingham would sustain, it was arranged that the matter should go to arbitration under the Companies Clauses Act. The arbitrators were appointed—one gentleman on each side—and they could not agree; the matter was therefore sent to the umpirage of Sir Henry Hunt. That gentleman took this view of it, and, if your lordships will listen, it appears clearly, on the face of the award—for he has very candidly set it out, in order that the parties might have a remedy if he turned out to be wrong—that the Corporation of Birmingham should be paid, not for the loss which they would sustain by being deprived of a portion of an undertaking which they were enabled to work profitably when in their hands, and the whole profits they were enabled to appropriate, but they were to be paid simply the loss which the Staffordshire Company would have sustained supposing the undertaking had remained in the hands of that Company. That was the view he took; and it seems to me, upon the construction of this Act of Parliament—and I think it is very clear—that it was an erroneous view. It has been decided in several cases, to which I can refer your lordships, that where you have a sale on one side and a purchase on the other, the question is, What is the loss sustained by the seller—what is the value, in fact, to the seller? That is decided in the case of *Stebbin v. The Metropolitan Board of Works*.

The LORD CHIEF JUSTICE: You have said enough to entitle you to a rule. Do I understand that cause is to be shown at once?

The ATTORNEY-GENERAL: I only ask for a rule *nisi*.

The LORD CHIEF JUSTICE: If there is any authority which you are going to cite, you can do so; but you have said enough to entitle you to a rule.

The ATTORNEY-GENERAL: My learned friend, the Solicitor-General, appears with me. He has not come here to show cause.

Baron HUDDLESTON: I thought Mr. Michael was here to show cause.

The ATTORNEY-GENERAL: No, my lord. *Stebbin v. The Metropolitan Board of Works* (Law Reports, vol. xl., Queen's Bench) is a case to which I wish to refer. In the judgment there is one passage which says this: "I think it is clear, from the language used in the petition, and the illustrations that might be given on the subject, that it is on the principle of compensation to the owner for the loss incurred by him. The question is not what the persons who take will gain by taking it, but what the person from whom it is taken will lose by having it taken from him."

The LORD CHIEF JUSTICE: Take a rule.

The ATTORNEY-GENERAL: I would refer your lordships to the case *In re The Duke of Buccleuch* (5th Law Reports, English and Irish Appeals, page 632), and *In re The Dare Valley Company* (6th Law Reports, Equity, page 432). I am sorry to trouble your lordships for a moment longer, but, in order to bring ourselves within the provisions of the statute, it is necessary that the complaint should be made before the last day of term; and I think it will be necessary to mention those complaints which we do make. We complain—1. The award is *ultra vires*, and not in conformity with the Acts of Parliament under which the umpire was appointed. 2. There are mistakes of law on the face of the award. 3. The umpire, on the award and affidavits shown, has awarded on matters not referred to in his decision. 4. The award does not determine any, or if any, not the correct principle of valuation within section 40 of the Birmingham (Corporation) Gas Act, 1875. 5. The umpire was only entitled to determine the compensation to be paid for the subject matter of sale, as described in the Act of Parliament, but he has determined also what is the subject matter of sale. 6. He had no authority to determine the meaning of the various Gas Acts, but has determined the meaning of certain sections in them, which he was not entitled, either by agreement of the parties or by Act of Parliament or otherwise, to determine. 7. As appears from the affidavits and his award, he has mistaken the subject matter on which he ought to have made his award, and has mistaken the subject matter of purchase and sale. 8. The award ought to, but does not state that the amount of compensation awarded is based upon the principle of valuation enunciated therein. 9. The principle of valuation enunciated in the award is bad in law, since it defines the subject matter of sale and purchase to be other than that which the seller had to part with at the date of the service of the notice to treat.

The LORD CHIEF JUSTICE: These are all arguments which might have been prepared before the arbitrator gave his decision.

The SOLICITOR-GENERAL: These are particular sections of the statute which define what the arbitrator shall be called upon to decide.

The ATTORNEY-GENERAL: 10. The principle of valuation enunciated in the award is bad for incompleteness and uncertainty, and no other arbitrator or valuer than the umpire can apply it in the other cases to which it was to serve as a guide to the arbitrators. 11. The umpire has not, in his award, awarded any compensation for the rights, powers, and privileges of the Corporation in relation to the manufacture, sale, and supply of gas within the district of the Commissioners, which matters are to be compensated for under the 2nd sub-section of the 8th section of the West Bromwich Improvement Commissioners Gas Act, 1876. 12. The award is bad on other grounds, appearing in the award and affidavits.

The LORD CHIEF JUSTICE: Take a rule.

Rule granted accordingly.

COMMON PLEAS DIVISION.—WEDNESDAY, NOV. 20.

(Before Justice DENMAN *and a Special Jury.)*

HACKER *v.* THE LONDON GASLIGHT COMPANY.

Mr. DIGBY SEYMOUR, Q.C., and Mr. YELVERTON, appeared for the plaintiff; and Mr. STAVELEY HILL, Q.C., for the defendants.

Mr. DIGBY SEYMOUR said that the action was brought by the plaintiff against the Company, for injuries he had sustained from an explosion of gas in consequence of the neglect of the defendants in not supplying the requisite quantity of water to the gas-meter at the Queen's Theatre, Long Acre. The position of the plaintiff at the time he sustained the injuries was that of gas man at the theatre. It was the duty of the defendants to supply the gas, and to attend to the regulation of the meter, and they were in the habit of sending at times, or ought to have sent, a person to put water into the meter; and this they did not dispute. On the 6th of November last year the stage-door keeper detected a smell or an escape of gas; and an examination was made in different places. At last instructions were given to the plaintiff to go, together with another man, to make a careful examination, and he went from one place to another without any light or candle, and eventually into the vault where the meter was, where he found a very large escape of gas. A jet of light was burning over the carpenter's shop close by, and in consequence an explosion was caused. The plaintiff had the presence of mind previously to throw himself on to his face on the floor; and happily, owing to the prompt measures that were taken, the theatre itself escapad. The plaintiff was injured very much, and had to be taken to the hospital. He suffered a great deal of pain, and the loss he sustained amounted to between £20 and £30, which seemed to be an extremely moderate sum. He did not think his learned friend (Mr. Staveley Hill) would give much trouble about that. The question would be, on which side was the negligence? The allegation of the defendants was not that the meter was supplied with water on the day preceding the accident, but that they supplied it shortly before, and that on the preceding day it was examined and found supplied. There would be an issue raised upon that. The plaintiff's case was that immediately after the explosion the meter was found hot and dry, and that the floor was also dry—a state of things that could not have existed if there had been water in the meter the day before. The defendants also said that before the explosion the plaintiff attempted to clear certain gas-pipes connected with the meter, and in so doing had forced from the meter the water which it contained on the previous day.

Mr. STAVELEY HILL said that by his direction an experiment had been made to test that defence, and it had failed. He would, therefore, withdraw that portion of the defence, the issue being raised on the first part.

Mr. DIGBY SEYMOUR said that this would simplify the matter considerably. It would, therefore, now come to this, that the overtake which the defendants pleaded, and on which they relied for the purpose of showing how the accident took place—namely, the negligently emptying of the water from the pipe in clearing other pipes of the same system—was a bad one. The issue, then, was twofold. The defendants accused the plaintiff of negligence, and the plaintiff accused the defendants of the same thing. The main charge of negligence against the plaintiff was withdrawn, and what remained was this: The defendants said that from some cause or other, but not from the one alleged, gas had been escaping in the vault where the meter stood, and that the plaintiff had been foolish enough to enter with a lighted candle. He did not do so. He was a man of experience, and knowing the danger, and the risk to his own life, of searching for an escape with a light, he did not take one with him, and was told by the Superintendent not to do so. If that were so, it could not be said that the plaintiff brought the accident upon himself. How, then, was it to be accounted for? The defendants were in charge of the meter, and they admitted their duty to put the water into it. The water was not there, and its absence could not be accounted for now by the line of defence which had been abandoned. He would show that the meter was dry immediately after the explosion. As the plea originally stood, before it was corrected in the margin, the defendants said that the man was there the day before, but, as amended, they said that he was not there the day before to inspect the meter; so that there was a second error in the defence set up. Certainly, on the day preceding, no one from the Company was seen there. What he expected the defendants would say was this: "We had a duty to fulfil, and we fulfilled it."

After some discussion between the learned Counsel, it was agreed that the damages should be fixed at £2 subject to proof.

The following witnesses were th n called:—

Arthur Hacker, examined by Mr. DIGBY SEYMOUR.

I am the plaintiff in this action, and reside at No. 7, Torrington Mews, Torrington Square. On Nov. 6th last year I was employed at the Queen's Theatre as a gas man. Mr. Pepall was my employer. It is my duty to be in attendance at the Queen's Theatre through the day and part of the evening, and I am responsible for the gaslight.

By Justice DENMAN: I turn it on in the morning and off at night. I light it myself. I have an assistant of the name of Robinson.

Examination continued: We are assistant gas men. On the evening of the 6th of November, between six and seven o'clock, my attention was drawn by Mr. Pepall to an escape of gas. In consequence of what he said, I went to ascertain where the escape of gas was. There is a floor called the "mezzanine," which is below the stage. I examined the different compartments underneath the stage, but went down to the mezzanine floor first.

By Justice DENMAN: The meter is kept in the vault or cellar below the mezzanine floor.

Examination continued: I did not find any escape of gas at the mezzanine floor. Robinson was with me. He and I then descended to the vaults. The mezzanine floor is fully supplied with permanent lights. There is a light also over the carpenter's shop, which is under the mezzanine, alongside of the vault. When I got to the door of the vault, Robinson waited at the bottom of the stairs. I went into the vault to see if I could ascertain where the escape was. The door of the vault was shut, but not locked. I went in by myself, and had nothing in the shape of a light with me. It was left on the prompter's box. Before I went down to the vault, Mr. Pepall cautioned me not to carry a light. When I went into the vault the escape of gas was too strong for me, so I came out again, and, when I was looking across the door, I saw a blue flame catch by the light over the carpenter's shop. This was about eight or ten feet from the door of the vault. I then threw myself down, and called out to my mate, "Look out, Joe." After the explosion I got out, and met Mr. Pepall on the stage. My face and both hands were burnt. The fire had caught me. I got a cork to stop up the syphon at the back of the meter This was to enable us to turn the gas on again, as the people were in the house. I looked at the meter, and saw it was short of water. I think the meter would hold about 60 gallons. It is a 300-light meter. The water it contained was below the water-mark; but I cannot tell how much below, because there is only a small gauge to look at; you cannot look inside the meter. I put about four or six gallons of water in; but first of all I turned off the gas. I was not insensible; but I was taken to the hospital. I did not see Mr. Hartwell fill the meter with water; but he generally comes to do so. He is supposed to come to the theatre every week for that purpose. He sometimes comes on a Monday, and sometimes on a Tuesday; but he is bound to come and take the index of the meter every week. On the day preceding the explosion I did not see him at the theatre. The explosion took place on Tuesday, the 6th of November. I was on duty the whole of the Monday. When I threw myself down on the floor it was dry.

Cross-examined by Mr. STAVELEY HILL: I have been doing the same duty at the theatre for about ten or twelve years, and during part of that time Mr. Hartwell has been engaged on the business on which he is now engaged. He comes every week to take the gauge of the meter, and to fill it when required. It requires filling with water about once a month or once in three weeks. There is a swan-necked syphon at the back of the meter, through which the water would pass if it rose above the water-line. The gas fills the space between the water-line and the top of the meter. There would not be a true register of the gas unless there was the requisite amount of water in the meter. The meter is connected with the main in the street, and the tap that turns off the gas from the meter is in the street. I have the key of that. The length of pipe from the meter up to the tap that turns the gas off is 4 feet. On the day previous to the explosion, Robinson and I searched the pipes to see whether there was any naphthaline in them. It is a sort of tarry deposit, which chokes the pipes. We had been using a force-pump in the mezzanine floor for the purpose of driving the naphthaline from some of the pipes, but not in the carpenter's shop. We were using it for the water-joints, about 40 or 50 feet away from the meter. We unscrewed the connection. We unfastened a small pipe, and screwed a socket on to the end that I unfastened. There is a tap on the stage. We shut the gas off on the stage, then unscrewed the connection, and fixed the force-pump on to the other side. We forced the pipes between three and four o'clock on the Tuesday afternoon. We screwed on the connecting-joint, but did not turn on the gas until the performance commenced. We left everything just as it was until before the performance commenced. We turned the tap on that supplies the water-joints before the explosion took place. The water-joints are used on the stage. They are so called because they are filled with water.

By Justice DENMAN: The water-joints consist of one gas-pipe inside another, so as to get the water between the two.

Justice DENMAN: If there was anything wrong in that particular part of the fittings, it would not cause an escape of gas?

Witness: Because it is turned on to the stage.

At the time at which this escape took place, on the 6th of November, was there anything that could have caused the gas to escape at that place on the stage?—There was no escape at the water-joints; that does not interfere with the meter.

You smelt an escape somewhere; but you did not notice an overpowering smell of gas until you got into the vault?—No.

Cross-examination continued: The nozzles or water-joints are about 20 or 40 feet away from the vault; the nearest is about 20 feet. Robinson and I may have begun to work at half-past three, and ended at half-past four. I sometimes see Mr. Hartwell when he comes, and sometimes I do not. I did not see him on the occasion in question, although he may have been there.

By Justice DENMAN: Robinson was not always at the same place at work with me during the whole of the day.

By Mr. DIGBY SEYMOUR: It has been my constant duty to clear out this naphthaline twenty or thirty times during twelve months, and it is a work with which I am perfectly familiar. In doing that I entirely separate the gas from the water-joints.

By the JURY: I had no lucifer matches with me.

Joseph Robinson corroborated the evidence of the last witness, with whom he made the inspection as to the escape of gas. He could not say whether the floor of the vault was wet or dry after the explosion.

Cross-examined by Mr. STAVELEY HILL: The water was below the water-mark, or the gas would not have escaped. I cannot say how many gallons had run out. The fact of the water being below water-mark would not, perhaps, indicate that the syphon was empty.

Mr. *W. Pepall*, examined by Mr. YELVERTON.

I am master gas man at the Queen's Theatre, and was so on the 6th of November last. Hacker and Robinson were in my employ on that occasion. I was the first who had intimation of the escape of gas, and I communicated with Robinson first, and then with Hacker. I advised them not to take a light with them to inspect the escape. After the explosion I was going down stairs, and Hacker was going up towards the street. He told me it was the meter, and that drew my attention to it. I went to the door because the vault was all ablaze, I shut off the gas right in the street; and three or four minutes elapsed between the time I saw it ablaze and the time it was cut off. After I cut it off I went into the vault and examined the meter. The part next to the wall, and nearest the syphon, was quite black. There was not any water in the syphon, otherwise it would not have caught alight. I should think the meter would hold from 60 to 80 gallons if it was full. I am not able to say whether there was any great want of water in the meter. The water ought to be up to the water-mark in the meter; and, if so, the syphon would remain charged.

Justice DENMAN: If the water got below the syphon it would evaporate?

Witness: It had been below the syphon for a considerable time.

Supposing the water once gets below the level sufficient to supply the syphon, how long will the syphon remain doing its work without a fresh supply to the meter?—I cannot answer that question. I think that would depend partly upon the weather.

Examination continued: I went into the vault and saw the floor, which was dry. At the time of the cleaning of the pipes there was no escape of gas.

Justice DENMAN: After the explosion, was there anything else done to set matters right, except putting the water in the meter?

Witness: No; the gas was turned on again, and all went right. There were no joints or pipes, leading from or to the meter, fitted or tightened. I saw the water put into the meter, and that enabled the performance at the theatre to take place. I did not see Mr. Hartwell on the day in question. He does not see me every time he comes to the theatre. He was generally pretty regular in his attendance. Monday was his day. Fielding and Bowden were also in the theatre on the Monday.

Joseph Robinson, recalled, said he did not see Mr. Hartwell at the theatre on the Monday or Tuesday, although he was in different parts all day.

James Fielding, examined by Mr. DIGBY SEYMOUR, said: I am the stage-door keeper at the Queen's Theatre. I believe Mr. Hartwell was there on Monday, Nov. 5. I saw him. It was I who discovered the smell of gas, and I saw Robinson and Hacker go to ascertain where the escape was coming from. They had been clearing the gas-pipes in the afternoon, and after their work was done there was not any escape of gas. There was an interval of three hours before I detected the smell. They had no lights whatever. The account given as to how the explosion occurred is correct.

Cross-examined by Mr. STAVELEY HILL: I remained only about five seconds when the explosion took place, because I went to the front to call the fireman.

Alfred Bowden, the fireman at the Queen's Theatre, testified to the state of the meter, and agreed with the other witnesses that it had not a sufficient supply of water. In his opinion the whole of the mischief was caused by the want of water in the meter.

By Justice DENMAN: I could not see the syphon; the heat was too great to enable me to get up to see it. The fire would be hot enough to dry any water in the syphon, but I think the water was out before the flame came on.

This concluded the evidence for the plaintiff.

Mr. STAVELEY HILL addressed the Jury on behalf of the defendants. He said that, although it might be conceded by both parties that there was an accident, resulting in a loss to the defendant of £25, the question for them to decide was whether the Gas Company had been guilty of any negligence. For that purpose they would have to consider what was the duty of the Gas Company. It was pretty clearly set forth in the second paragraph of their statement of defence:—"They are a company supplying gas to be measured in a meter to the persons using it at the Queen's Theatre; that the meter is placed at the end of a pipe, which meter, and which pipe leading to that meter, are the property of the Gas Company; all beyond that on the house side of the meter being the property of the Queen's Theatre, and in respect to the use or abuse of which the Gas Company are not in any respect liable." Before they could fix the Gas Company with any liability in the matter, what they had to find was that the Company had been guilty of some negligence in respect to the meter, or in the piece of pipe leading from the meter to the street. Nothing had been said by the plaintiff about the piece of pipe, and nothing by the defence; and the question they had to consider simply was, Had the Gas Company been guilty of any negligence with regard to the meter they supplied, or in their conduct with regard to that meter while it stood in the vault, and was it owing to any negligence on their part that any accident took place? The negligence imputed to the Gas Company was that they supplied an insufficient quantity of water to the meter. What they undertook to do was to provide the meter with an adequate supply of water, so that the gas might be properly measured off to the consumer as it passed through that part of the meter which made the revolutions; but in order to keep that measure correct, it was necessary that there should be a fixed quantity of water, because if there were too much or too little, the space would be larger or smaller, and the gas that passed through could not be properly measured. The question was whether the pressure of the gas would drive out any small quantity of water that might be in the syphon, and he would produce evidence to show that no amount of gas could drive the water out. If there had been a due supply of water to the meter, then there was no negligence for which the Company were liable. If there had been something abnormal—something that happened for which they could not account, and for which no fair reason could be given—which caused the gas to escape from the meter, that would not be sufficient to fix them with negligence for an escape of gas from the meter, if they were satisfied that the Company did their duty in complying with the requirements of the meter, and seeing that it was properly supplied with water. The defendants said that on the Monday afternoon immediately preceding the explosion, there was a proper supply of water in the meter; and if they found, on the scientific evidence of Mr. Tully, that these meters were so constructed that from no earthly cause could it happen that they could require a fresh supply of water to be put in them in anything like the space of 24 hours, or even four, five, or six months, and that no instance had ever occurred in which, in anything scarcely short of that space of time, a meter ever required an amount of water which would necessitate any adjustment at all in the syphon—if they found that, and that Mr. Hartwell was on the day and week before, and constantly, there taking the amount of gas consumed, and that he was there at four o'clock on the day immediately preceding that on which the explosion occurred, then they ought to give a verdict for the defendants, who would certainly have discharged all the duties imposed upon them. The other question before them was whether the plaintiff in any way contributed to the negligence. He felt clearly that if it came out, as it would come out, that the meter had been properly supplied with water, then there would be no evidence of negligence.

The following witnesses were then called for the defendants:—

George Pronger, examined by Mr. STAVELEY HILL, said: I am in the employ of the London Gaslight Company. It is my duty to supply water to the meters. I generally examine the gauge-glass, to see whether there is a sufficient quantity of water in the meter. I examined the meter on the 16th of October. The water in the gauge-glass showed that the meter was duly supplied with water.

Cross-examined by Mr. DIGBY SEYMOUR: The glass is clear, and resembles the glass of a thermometer. I never found anything go wrong with the glass. We generally examine about 20 large meters a day, but sometimes not so many. We are never pressed for time when we are examining large meters.

By Justice DENMAN: I have the entry of the meter on the 16th of October in my book. [Book handed to his lordship.] There are two meters at the Queen's Theatre. I have also another book relating to these meters. If we found an escape of gas we should put it in the book. I should also make an entry if there was a leaky syphon. They would leak if the solder gave way. I cannot say whether or not the syphon at the Queen's Theatre was soldered or not.

Re-examined by Mr. STAVELEY HILL: Mr. Hartwell is fitter to the Company, but he also attends to the meters, and to the one at the Queen's Theatre.

Charles Hartwell, examined by Mr. STAVELEY HILL, said: I am foreman fitter in the employ of the London Gas Company. I take the register of the meter at the Queen's Theatre every week for the weekly account. On the 5th of November last year I examined the water-line, and found it correct. I was also there on the 16th of October, at the same time as the last witness In my book there is a column for remarks. [Book handed to his lordship.] I have not made any note as to the explosion on the 5th of November. I am the meter-fitter, and it is my duty to go round every week for the accounts. It is both my duty and Pronger's to examine the meters. I distinctly say that there was water in the meter, and at the proper level. I was sent for on the evening of the 6th of November, at a quarter to seven. That was immediately after the explosion. I found the gas was turned off, and I asked them to turn it on. I poured about 3½ gallons of water into the syphon to seal the overflow. I poured in the water until it overflowed; but I cannot say whether there was previously water in the syphon or not. After such a meter was once filled with water, it would be about three weeks or a month before it would require refilling; and at the end of that time, although the water was below the line, water would still remain in the syphon. It was filled on the 22nd of October, in my presence, by a man of the name of Villiers. I do not know of anything that would send the water out of the syphon, unless it was blown out or drawn out. Nothing was done in the way of repairing the syphon after the explosion. After the water was put in, I remained the whole evening and watched the meter, and it worked perfectly correctly.

Cross-examined by Mr. DIGBY SEYMOUR: I cannot suggest any way in which the explosion could take place, except that the water was out of the syphon. Sometimes mistakes are made with regard to the registering of the meter, but not with regard to the water-gauge. Monday was the regular day for going round. Sometimes there is more work to be done one day than another; but we are not generally in a hurry.

Re-examined by Mr. STAVELEY HILL: On the day in question the water was full in the meter, and I cannot suggest any theory by which the accident occurred.

Mr. *Thomas D. Tully*, examined by Mr. STAVELEY HILL, said: I am Superintendent of the London Gas Company, and have had experience in gas matters for 40 years. I know the meter at the Queen's Theatre, and I do not think it would require refilling for four or six months. I selected the site for the meter; it was a damp place, and there was no evaporation. I saw the syphon tube, and nothing has been done to it since, and it works properly.

Cross-examined by Mr. DIGBY SEYMOUR: I cannot suggest any theory by which the accident would happen.

Mr. *F. W. Hartley* said that he examined the gas-meter at the Queen's Theatre in March, 1878. The syphon was fully charged with water, and was perfectly incapable of leaking.

John Lawton, a fitter in the employ of the Gas Company, said he inspected the meter on the 12th of November. It was all perfect, except the index-glass. The glass water-gauge was working correctly. If the meter had been properly charged with water, it would have gone for six months.

Cross-examined: The gas could not escape if water was in the syphon. The glass of the water-gauge might get soiled from dust, and not be so clear at one time as at another.

This concluded the evidence for the defentants.

Mr. STAVELEY HILL briefly addressed the Jury, and Mr. DIGBY SEYMOUR replied upon the whole case.

Justice DENMAN, in summing up the evidence, said that the case had been very neatly put before the Jury, and it was one entirely for them to decide; but he must tell them that the law was that the plaintiff should establish his case, and if he had not established that part of his case by which he intended to make out that he was injured owing to a neglect of duty on the part of the defendants, he must fail. After reviewing some of the evidence, the learned Judge pointed out that it had been said that the plaintiff himself contributed to the injury he received by want of caution on his own part. If he had taken a light into the vault, it would have been gross negligence, and he could not have recovered damages. That was positively denied, and there was no evidence on the other side as to this point. Therefore it would be a strong thing to hold that the defendants were not liable on the ground of contributory negligence. The case was simply this: Had it been exhaustively proved to their satisfaction that the meter must have been short of water? If so, then it was the duty of the defendants to keep it full of water. But perhaps, without subjecting themselves to any great moral blame, some defect in the meter might possibly have misled the servants of the Company, and although they thought it was in proper working order, something or other escaped them which they ought to have observed; because these were matters in which the highest skill was necessary. If the Jury were satisfied, beyond reasonable doubt, that the accident was owing to the want of water in the meter, the defendants would be responsible, unless they thought the plaintiff had contributed to the accident by some negligence of his own.

The JURY consulted, and almost immediately returned a verdict for the plaintiff for the amount (£25) which had previously been agreed upon.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

Dr. Whitmore, in his Annual Report for 1867, just issued, says that the mean illuminating power of the gas supplied to Marylebone from The Gaslight and Coke Company's works at Fulham during the whole year, when consumed in a 24-hole standard Argand burner, at the rate of 5 cubic feet per hour, was equal in the intensity of its light to that obtained by burning 16½ sperm candles of six to the pound, and consumed at the rate of 120 grains per hour each candle. The mean highest illuminating power during the year was 17·11 candles, and the mean lowest 15·97 candles. The highest illuminating power observed in any one month was 17·71 candles—this occurred in November; the lowest was 16·60—this occurred in December. The mean amount of sulphur found during the year in 100 cubic feet of this gas was 16·41 grains, being 2 grains less than in the year 1876. The largest amount found was in December, when it was 18·40 grains; the lowest in September, when it was only 14·87 grains. As regards ammonia, the mean quantity found during the year was only half a grain. The gas supplied from the Beckton and Bow works during the year gave an illuminating power equal to the light of 16·45 candles. The range was between 15·24 and 17·41 candles. The largest amount of light was given in March, when the mean light was equal to 16·86 candles; the smallest in January, when it equalled 16·08 candles. The mean quantity of sulphur found in this gas during the year was 13·19 grains, as against 12·97 grains in 1876. The cannel gas supplied from the Pimlico works, when consumed in a standard bat's-wing burner at the rate of 5 cubic feet per hour, gave during the year a mean light equal to 20½ candles; the range being between 18·46 and 21·60 candles. The largest amount of light was given in July, when it equalled 20·78 candles; the smallest in December, when it was 20·13 candles. The mean quantity of sulphur found during the year was 16·16 grains, a trifle less than in the previous year, whilst the ammonia was less than half a grain. The pressure of all the gases was, upon the whole, satisfactory; and on no single occasion was any trace of sulphuretted hydrogen detected in either of them by the ordinary tests.

METROPOLIS WATER SUPPLY.

Dr. Whitmore, in his report for last year on the composition of the Thames water supplied to the parish of Marylebone by the West Middlesex and Grand Junction Water Companies, says: "I have much satisfaction in stating that with hardly a single exception the water of both Companies has been excellent. On no occasion was any turbidity observable in the water supplied by the West Middlesex Company, but, on the contrary, I found it invariably clear, bright, and almost colourless. Once or twice only was the water of the Grand Junction Company slightly turbid. As regards the amount of mineral and organic matter contained in these waters, I found both somewhat less than in the previous years. The organic or albumenoid ammonia, which may be taken as the test of the presence of the sewage matter in the water, generally does not exceed the seven hundredth part of a grain in one million grains of water—an amount so infinitesimally small as not, in any objectionable degree, to deteriorate the quality of drinking water. In water derived from the chalk formation, by means of Artesian wells, there is certainly, as a rule, a considerably reduced amount of this organic ammonia, and from several such sources there is sometimes none at all; but, on the other hand, an objectionable quality belongs to these waters, which that from the River Thames does not possess—most of them are exceedingly hard; and this quality renders them very unfit for washing and many other domestic purposes. Of late years the question of our London water supply has been greatly agitated by many persons—engineers and others—who may or may not have a personal interest in keeping up the excitement. I feel confident, however, that the mass of the population of this great city is, on the whole, satisfied with the quality and quantity of our present supply, as well as the sources from which it is obtained, and would regard with considerable consternation and dismay any attempt to deprive them of the supply at present obtained from our noble river."

Lieut.-Col. Bolton reports that the state of the water in the Thames at Hampton, Molesey, and Sunbury (where the intakes of the West Middlesex, Grand Junction, Southwark and Vauxhall, Lambeth, Chelsea, and East London Companies are situated) was in a good condition from the 1st to the 25th of October, after which it became turbid, and continued in a bad state during the remainder of the month. The highest flood state of the river at Molesey and Hampton during the month was 1 foot 10 inches above summer level, and the lowest 3 inches below summer level. The rainfall as taken at the Chelsea works was 1·94 inches in October. The water in the River Lea was in good condition and generally clear during the month.

The Registrar-General publishes the following return of the average daily quantity of water supplied by the London Water Companies, during the month of October. According to this, 135,676,172 gallons or 616,439 cubic mètres of water (equal to about as many *tuns* by measure, *tons* by weight) were supplied daily, or 246 gallons (111·8 decalitres — rather more than a *ton* by weight) to each house, and 34·6 gallons (15·7 decalitres) to each person, against 32·1 gallons during October, 1877.

Companies.	Number of Houses, &c., supplied in Oct., 1877.	Oct., 1878.	Aver. Daily Supply of Water in Gallons* during Oct., 1877.	Oct., 1878.
Total supply	538,021	551,972	122,683,192	135,676,172
From Thames	253,253	260,472	61,814,324	68,244,356
„ Lea and other Sources	284,768	291,500	60,868,868	67,431,816
Thames.				
Chelsea	28,859	29,152	8,425,200	8,157,100
West Middlesex	50,016	51,251	9,671,577	9,898,593
Southwark and Vauxhall	79,190	81,329	18,800,000	24,539,091
Grand Junction	37,683	38,462	11,057,547	11,455,529
Lambeth	57,505	59,778	13,860,000	14,194,043
Lea and other Sources.				
New River	126,144	127,577	26,919,000	28,878,000
East London	113,192	117,084	26,635,800	29,710,000
Kent	45,432	46,839	7,314,068	8,843,816

* Including that for manufactures and for various purposes other than for domestic consumption.

Note.—The return for Oct., 1878, as compared with that for the corresponding month of 1877, shows an increase of 13,951 houses, and of 12,992,980 gallons of water supplied daily.

Dr. Frankland reports, as the result of his analyses of the waters supplied to the Metropolis during October, that, taking the average amount of organic impurity in a given volume of the Kent Company's water, during the nine years ending December, 1876, to represent unity, the proportional amount of such impurity in an equal volume of water supplied by each of the other Companies, and by the Tottenham Local Board, was:—Tottenham, 1·2; New River, 1·2; Colne Valley, 1·5; Kent, 1·8; East London, 2·3; Lambeth, 3·1; Southwark, 3·3; West Middlesex, 3·3; Grand Junction, 3·3; Chelsea, 3·9. The Thames water supplied to London considerably improved since September, and it was efficiently filtered by all the Companies. The best water from this source was supplied by the Lambeth Company, and the worst by the Chelsea Company. The quality of the Lea water delivered by the New River and East London Companies was much better than that of the Thames; but the New River water was slightly turbid, owing to the presence of white filametous crystals of carbonate of lime. The water supplied by the Kent and Colne Valley Companies, and by the Tottenham Local Board, was clear and of its usual excellent quality for dietetic purposes. The Colne Valley water was also soft, and was the only water fit for washing delivered in London. Seen through a stratum two feet deep, the waters presented the following appearances:—Kent, Colne Valley, Tottenham and East London, clear and colourless; New River, colourless, and slightly turbid; West Middlesex and Lambeth, nearly colourless; Southwark and Grand Junction, very pale yellow; Chelsea, pale yellow.

Results of Analyses expressed in Parts per 100,000.

Companies or Local Authorities.	Total Solid Matters.	Organic Carbon.	Organic Nitrogen.	Ammonia.	Nitrogen, as Nitrates and Nitrites.	Total combined Nitrogen.	Chlorine.	Total Hardness.
Inner Circle.								
Thames—								
Chelsea	25·90	·208	·024	0	·090	·114	1·7	18·9
West Middlesex	28·06	·176	·019	0	·162	·181	1·6	19·1
Southwark	28·06	·176	·017	0	·160	·177	1·6	20·6
Grand Junction	27·06	·174	·021	0	·116	·137	1·6	19·4
Lambeth	28·96	·169	·012	0	·095	·107	1·6	20·6
Other Sources—								
New River	26·60	·108	·008	0	·200	·208	1·5	20·6
East London	28·08	·146	·013	0	·087	·100	1·6	19·4
Kent	44·66	·096	·011	0	·430	·441	2·5	29·7
Outer Circle.								
Colne Valley	12·24	·071	·018	0	·293	·316	1·4	5·3
Tottenham Local Board	47·32	·065	·011	·005	·449	·464	3·3	27·9
Corporation of Birmingham*	27·00	·238	·032	·003	·110	·144	1·5	20·2
Corporation of Glasgow+.	3·20	·159	·007	·000	·008	·015	0·55	1·43

* Analyzed by Dr. Alfred Hill, Medical Officer of Health and Analyst to the Borough.
+ Analyzed by Dr. E. J. Mills, F.R.S., of Anderson's College, Glasgow.

Note.—The numbers in the analytical table can be converted into grains per imperial gallon by multiplying them by seven, and then moving the decimal point one place to the left. The same operation transforms the hardness in the table into degrees of hardness on Clark's scale.

LEICESTER GAS COMPANY.

A Meeting of this Company was held on Wednesday, the 13th inst.—Mr. W. E. Hutchinson in the chair—for the purpose of affixing the seal of the Company to the deed of transfer of the gas-works to the Corporation of Leicester, and for other business.

The Chairman said that he supposed this would be the last occasion on which the Directors and Shareholders of what was, up to the 30th of June last, the Leicester Gaslight and Coke Company, would meet. They were all aware that, after the 30th of June, the undertaking passed into the hands of the Town Council of the Borough of Leicester, in pursuance of an agreement which was entered into with their sanction, and which had been since ratified by Act of Parliament. The meeting had been called to have submitted to them certain resolutions with respect to the business which had to be transacted before the undertaking was finally wound up. The accounts of the Company for the half year ending the 30th of June were made up and signed by the Auditors, and by himself as Chairman. As the Company had nearly ceased to exist, it was not thought necessary to call together the Shareholders for the half-yearly meeting, for, as a matter of fact, the accounts were not audited on the 30th of June last, but in September. After the accounts were audited it was shown that an increased dividend, quite up to the maximum allowed by law, had been earned, and there was also a very handsome surplus which was handed over to the Town Council. The deed of conveyance was in the room, and he would ask the Secretary to read it. The resolution he had then to submit to the meeting followed as a matter of course, the undertaking having become vested in the Town Council, and the Shareholders having received the securities in lieu of their shares, as stipulated in the agreement. He moved—"That the common seal of the Company be affixed to the deed of transfer of the undertaking to the Mayor, Aldermen, and Burgesses of the Borough of Leicester."

Mr. Frisby seconded the resolution, which was carried.

The Chairman said the only remaining resolution to be submitted was in respect to the clause in the Act of Parliament, which had placed the sum of £4000 at their disposal for the purpose of making compensation to the Directors and the officers of the Company who lost their positions and emoluments by the change which had taken place. In the first instance, that sum was to be applied in paying any expenses that had been incurred since the 30th of June last, and also in rewarding meritorious servants of the Company in such manner as the Directors thought fit. The Shareholders were aware the change in the management of the affairs of the Company, which took place some years ago, very considerably increased the duties and responsibilities which devolved upon the Directors, and upon the Committee of that body which it became necessary to appoint through that altered management. On several occasions it was mooted by the Shareholders that additional amounts should be placed at the service of the Directors, in consequence of their increased duties; but it was deferred, because of the near approach of the time for the passing of the works into the hands of the Town Council. It had been usual, when transfers of this kind were undertaken, to place a sum of money at the disposal of the Company, for the purposes he had mentioned. The Directors had prepared a resolution, which, if it met with the approval of the Shareholders, they would be gratified if the meeting would adopt. It was—"That with regard to the sum of £4000 retained pursuant to the Leicester Corporation (Gas and Water Transfer) Act of 1878, any surplus remaining after application by the Directors in payment of expenses and compensation of officers and rewards to meritorious servants, be placed at the disposal of the Directors, to be divided in such manner as they think fit."

Mr. Dove proposed the adoption of the resolution, which was seconded by Mr. Oliver, and carried.

The Chairman said the business now lay in a very small compass, and when that had been transacted the Company would become extinct. They were incorporated in 1821, so that they had existed for some 57 years. He

became a shareholder in 1834, and a Director in 1835. He had seen great changes during that period, both in the proprietary and in the success of the undertaking. He remembered on one occasion they were obliged to go without a dividend, and their dividends were very moderate to begin with; but they gradually increased until on the original shares a dividend of 10 per cent. was paid, on the next creation 7½, and on the last creation 7 per cent. He took the chair in 1840, and he had been Chairman ever since. He and his colleagues would ever remember the pleasant way in which they had always been met by the Shareholders, and the confidence which had been placed in them. Personally, he regretted the transfer, because this was an undertaking which he had great pleasure in looking after; and he had no doubt, notwithstanding so much had been said about the electric light, that there would always be room for gas. He believed nothing would supersede it for general purposes, but he had no doubt that for large areas, and in very large buildings, the electric light might be used with success. The gas undertaking was managed at present pretty much as it was under the Company. They left behind them a valuable staff of officers, clerks, and foremen, and he believed that everything went on as usual. He only hoped that in the hands of the new possessors the same satisfaction, and desire for the production of gas at its lowest fair price, would continue to be observed.

Mr. Dove proposed a vote of thanks to the Chairman and Directors.

Mr. Oliver seconded the motion, which was carried.

The Chairman briefly replied, and the proceedings terminated.

BOMBAY GAS COMPANY, LIMITED.

The Half-Yearly Meeting of the above Company was held at the Cannon Street Hotel, on Thursday last—D. T. Evans, Esq., in the chair.

The Secretary (Mr. W. Marshall) having read the notice convening the meeting, the following report and statement of accounts were taken as read:—

Your Directors have pleasure in submitting to the Shareholders a statement of accounts, duly audited, for the half year ending June 30 last.

There is an increase in the gas and meter rental, as compared with the corresponding half of last year, and the number of private consumers is increasing; but there has been a considerable falling off in the returns from coke, and the loss on exchange has been severe. The result, however, is not unsatisfactory when due consideration is given to the depression of trade, which has so long prevailed in Bombay, as in most commercial centres.

Acting on a suggestion made at the last ordinary meeting, your Directors have divided the reserve-fund into two parts—one for the equalization of dividend, and the other for depreciation of plant, materials, &c.

Your Directors, after much consideration, recommend the appointment of an Audit Committee of three gentlemen in Bombay.

The amount at the credit of profit and loss account for the half year is £3016 0s. 5d., which, with the balance of £825 4s. 8d. brought forward, makes £3841 5s. 1d.; and, after providing for the debenture interest, the balance available for appropriation is £3644 15s. 1d., out of which your Directors have declared the usual interim dividend of 3½ per cent. for the half year (free of income-tax), leaving a balance of £244 15s. 1d. to the credit of the current half year.

The interim dividend will be payable on and after the 2nd of December next.

General Balance, June 30, 1878.

Dr.				Cr.			
Capital authorized— (50,000 shares, at £5 each—£250,000.)				Construction account		203,287	17 1
40,000 shares, £5 paid	200,000	0	0	Exchange equalization account		1,283	0 3
10,000 shares, £4 paid	40,000	0	0	Retort account		978	19 0
	£240,000	0	0	Services account		106	9 0
Debentures	6,550	0	0	Stocks, viz.—			
Amount owing by the Company	1,296	10	7	Chandeliers, brackets, &c.	5,039	18	5
Reserve-fund—				Brass and iron goods, &c.	5,297	12	3
Equalization dividend account	5,000	0	0	Mains, services, and tools	1,912	10	9
For depreciation of plant, &c. £3,523 2 3				Meters	2,829	11	10
Less written off 112 9 5				Coal	26,312	8	3
	3,410	12	10	Residual products	163	17	6
Insurance-fund	1,814	18	7	Amount owing to the Company	4,642	18	5
Passage-fund	383	17	11	Cash at bankers, on deposit, and in hand, viz.—			
Balance to general revenue account	8,644	15	1	In Bombay £9,593 12 11			
				In London 651 19 4			
				Bank bills in hand 5,000 0 0			
					15,245	12	3
	£267,100	15	0		£267,100	15	0

Profit and Loss Account.

Coal carbonized	£7,333	6	2	Gas and meter rental	£19,871	16	9
Wages	1,207	2	6	Coke, tar, fittings, &c.	3,134	13	0
Purifying	12	0	0				
Maintenance of retorts	195	15	3				
Trade and general charges	837	17	8				
Salaries and Collectors commission	1,801	19	6				
Rents, rates, and taxes	813	1	9				
Directors and Auditors remuneration	676	5	0				
Bad debts	18	9	2				
Law charges	4	19	10				
Interest account	69	12	0				
Exchange ditto	2,500	0	0				
Balance	8,016	0	5				
	£23,006	9	3		£23,006	9	3

General Revenue Account.

Interest on debentures	£196	10	0	Balance, Dec. 31, 1877	£10,425	4	8
Balance carried down	8,644	15	1	Less dividend paid June 1, 1878	9,600	0	0
					£825	4	8
				Balance for half year ending June 30, 1878	8,016	0	5
	£8,841	5	1		£8,841	5	1
				Balance for appropriation	£8,644	15	1

The Chairman said: The report and accounts which have been circulated amongst you speak so fully as to the existing condition of the Company, that I need not enter into particulars with reference to the figures, but express my readiness, when I have closed my speech, to answer any questions that the Shareholders may put to me with reference to them. The progress of the Company would have been, upon the whole, satisfactory during the six months under review, but for two adverse circumstances to which I shall presently allude. It has been satisfactory in this, that there has been an increase in the gas-rental, while the cost of working stands very much about the same as it was. There are two circumstances which have pressed with great severity upon the Company; and those are, first of all, the sale of coke; and, secondly, the enormous loss we have sustained by the exchange. With reference to the sale of coke, I should tell you that two-thirds, if not three-fourths, of the coke produced by this Company used to be sold to the lime-burners in the neighbourhood of Bombay; but, owing to the adverse state of business there, and the commercial distress that has prevailed, we have lost that market. There has now for nearly two years been scarcely any sale of coke to the lime-burners, and therefore we have been driven to the necessity of finding a fresh market. I think, however, we may say that we have done fairly well in that direction. The increase in the gas and meter rental for the six months is certainly not large; but it is satisfactory to find that there has been a steady increase, amounting to £304 14s. 10d. The increase in the number of private lights during the twelve months ending the 30th of June last was 1359, and I am happy to assure you that that increase steadily continues. It is a very satisfactory feature that our private consumption is progressing. During the past six months the increase amounted to 582,600 cubic feet. The leakage was 12½ per cent., which is not excessive, as about 10 per cent. is considered a fair leakage. The coke sales, as I have said, have fallen. We have realized £2000 less from coke this half year, for the reasons I have already given you. Tar and fittings have both improved. The sale of tar is now becoming a matter of importance to us. It makes a very favourable return, and the profits on the fittings amount to £349 6s. 6d. I come now to the most serious item, and that is the loss on exchange. This has been very severe, and no human foresight or human wisdom could have averted it. The best intellects that are applied to it, the best advice the Government can command, cannot alter the value of the rupee. The loss to the Government alone is known to be more than £3,000,000 a year; and how seriously the depreciation of the rupee must affect the families of Indian civilians and military who are in this country, I leave you to judge. I sincerely wish the usage for six months bank bills could be reduced to three months, and I think that will take place, for there is great dissatisfaction with the present system, and I believe the bankers are disposed to shorten the time. The average exchange we have obtained has been 1s. 9d. per rupee. We have had money, however, at as low a rate as 1s. 8 1/16d. However, that will have to be accounted for when we meet you six months hence. Of this loss on exchange, £2500 is charged against profit and loss for this half year, and £1263 is carried over to be dealt with next half year. This amounts to something more than 1½ per cent. on your dividend, which otherwise might have been brought up to 9 per cent. We have £6500 of the £20,000 debentures to pay off. They become payable on the 1st of January, and we proposed to sweep them off, with the exception of one debenture of £1000, which we have renewed for six months only, at the reduced rate of interest of 5 per cent. I think we may congratulate ourselves that we have done so well as to pay them all off in the short period they have had to run. With reference to coal, which is the prime article of consumption with us, on the 30th of June we had upwards of 15,000 tons in stock; at present we have about 12,000, and, of course, we shall avail ourselves of opportunities as they occur. It is not so much the price of coal as the price of freights that affects us; but though freights are now low, we have such a large stock in hand that we do not think it advisable to charter just at present. In about six months, however, we shall be looking for low freights, and I hope we shall get them. I am happy to tell you that our coke, tar, and breeze are all sold in advance up to the end of the year, at reasonable rates, and our Manager expects that we shall have an improved price for coke about the close of the year. We are doing the best we can to create a market, and, at the suggestion of the Manager, we are now sending out coke stoves for cooking. I am sorry to say that the English manufacturer has to apply to the Frenchman to get the samples we are sending out. I was very much struck, when in Paris a month ago, on visiting the extensive pavilion that the Company supplying Paris with gas had erected in the grounds of the Exposition, as well as with the infinite uses to which gas is applied in Paris for heating and for domestic purposes, as well as for lighting. It has been pushed to a very far greater extent in France than in this country. I saw that it was used even for heating the common flat-irons that laundresses use, as well as for cooking. Of course, gas is not wanted for heating purposes in Bombay, but I have no doubt that its use will eventually be vastly extended for domestic purposes. You may rest assured that this will be done as promptly as possible. The condition of the works is everything we can desire. All we have to provide for is merely the ordinary wear and tear and displacements. At the last meeting a suggestion was made by one of the Shareholders that we ought to utilize our ammoniacal liquor. We have taken active steps during the past six months to ascertain whether we can make sulphate of ammonia or carbonate of ammonia out of it. We have employed an able expert, and sent him to inquire into a patented process that was recommended to us for the manufacture of carbonate of ammonia. The difficulty as regards the sulphate is this, that the acid necessary to throw down the sulphate costs about £36 per ton, it requires about a ton of acid to make a ton of sulphate, and if you only obtained £20 per ton when it is produced, of course it could not be worked profitably. We have, however, every reason to hope that eventually we shall be able to work it profitably. Our Manager seemed to be of opinion that he could not get the ammoniacal liquor to a sufficient degree of strength. He says that Australian coal does not hold the ammoniacal liquor in sufficient quantity and strength to enable us to work it satisfactorily. Inquiries are still going on. We have applied to the gas manufacturers in Australia—at Sydney and Melbourne—to find out what their experience has been, and meanwhile we have had a report made to us by a gentleman, in England, who is acquainted with these things in Australia. That report seems to indicate that we shall be able to utilize the ammoniacal liquor out of the Australian coal,—which we are now chiefly using because we find it less liable to spontaneous combustion than the English coal. It does not make so weighty and compact a coke, but it yields a better per centage.

A Shareholder inquired what the two coals relatively cost?

The Chairman: When we look at the result of the residual products, I think the Australian costs nearly the same as the English.

Mr. Stephenson: I think the Australian coal is cheaper than the English—depending upon freight. It is dearer at the pit's mouth.

The Chairman: But we have a long voyage out, and coal deteriorates on a voyage in a hot climate. The Australian coal is a compacter and harder coal; the English coal is smaller and friable. There is an allusion made in the report to the fact that, after much consideration, we have come to the conclusion that we had better have an Audit Committee in Bombay, and I shall ask you to give us authority to appoint three gentlemen. At present the local Auditor gets £100 a year. Our notion is to appoint three gentlemen, having different qualifications. One will be thoroughly conversant with stores, which is a very important point with us. Our idea is to give £50 each to the three. I do not know whether it is advisable that I should refer to the subject of the electric light, which is no doubt present in every gas shareholder's mind at this moment. I have seen it in actual operation in Paris, and we have all read Mr. Sugg's report and Mr. Livesey's letter as to the practical application of electric lighting. It is a great question whether it will ever come into universal use. I cannot myself presume to give an opinion of any value, but I have a personal friend, Mr. Michael, Q.C., who was for many years, and I believe still is, Chairman of the Swansea Gas Company, and who practises in Parliament, and has had very large experience in matters of gas legislation. A meeting of delegates for various provincial gas companies was held at the Westminster Palace Hotel, a few days ago, to consider whether it might not be advisable to go to Parliament—each company separately, or all together—for some comprehensive measure to obtain power for existing gas companies to light by electricity. I will just read a few lines from Mr. Michael's

speech, reported in the JOURNAL OF GAS LIGHTING of November 19. Of course, the great and material question is, Can Electricity be economically employed? The initial cost for motive power is so great, in addition to the pay of the engineers and attendants, to keep up the candles and carbons, that it would deter persons of small means from using it. What Mr. Michael says with reference to the cost is this: "Now the cost, at the present time, in Paris, of burning the carbon alone, the cost of its conduction to the place of burning, and all the expenses incident to the production of the light, came to five-sixths of a penny per hour, and to burn gas in London would cost exactly one halfpenny to give the same amount of light. That was the mere candle which was burned, without any of the costs incident to the production of the electricity. The capital employed, and all the incidental expenses connected with the production of the electric light, were very nearly equal to double the present cost of gas. This at once removed the possibility—unless something better were produced—of their having anything to fear from the introduction of the electric light." Further on he says: "The important question was, what should be the attitude of the Gas Companies, not as affecting the value of their property, but as affecting the estimation of the value of their property; and it was quite true that the two things sometimes, unfortunately, went together. He held that their property was not in the slightest degree deteriorated by what had been done or could be done." I will trouble you with another short extract from the "Circular to Gas Companies" in the same paper: "A very interesting exhibition of the electric light was made last Friday, at the works of the Chartered Gas Company, in the Horseferry Road, and an able account of the means of producing the light was given by Mr. W. Sugg. The Chartered Company have been experimenting for some time with a Siemens machine, which is driven by waste power from the exhauster engine. Mr. Sugg has carefully determined the illuminating power of the light obtained, which he sets down at from 1500 to 2000 candles. The cost of producing this light by steam power is not given to us, but we are told that a gas-engine, consuming gas sufficient, if it were burned in Argand burners, for illuminating purposes, would evolve the light of 1600 candles. Consumed for the production of mechanical power, and applied to the development of the electric light, an illumination of from 3000 to 4000 candles may be obtained. But this light is too intense to be borne by the human eye, and requires to be modified by translucent opal shades, which cut off, perhaps, 50 per cent. of its illuminating value. Thus, it turns out that the gas used to produce the mechanical power necessary for the production of the electric light is just about equal in illuminating value to the light produced by the exercise of mechanical force." It is a very remarkable fact that the best experts cannot get at the actual cost of the production of the electric light. That is still kept in the background.

Mr. NORTHOVER: The best proof is that they do not give quotations for it anywhere.

The CHAIRMAN: Mr. Michael, in the speech above quoted, said "he had heard that morning that the whole of the lights in the Place de l'Etoile had been removed, and he had also heard from the same correspondent that the whole of the lights would be removed from the Place de l'Opéra."

Mr. NORTHOVER said he knew that the contract was out, and the Municipality were not disposed to continue it. It was only on the understanding that the Compagnie Générale d'Electricité would charge a lower price that the contract was renewed, because they felt that the removal of lights at present would be rather fatal to their shares, and to the success of the Company.

The CHAIRMAN: If what the first leader it the JOURNAL OF GAS LIGHTING says be true, "that the gas used to produce the mechanical power necessary for the production of the electric light is just about equal in illuminating value to the light produced by the exercise of mechanical force," no profit can arise out of it. I do not know that I need further allude to this matter of the electric light.

A SHAREHOLDER asked how the Company were protected, as to any other lighting company, by their concession.

The CHAIRMAN: We renewed our contract with the Municipal Commissioners for fourteen years, twelve of which are unexpired; and in the contract there is this clause: "If six of the principal London Gas Companies at any time during the term of this contract adopt a gas, or other means for street lighting, essentially different from the gas now generally used for that purpose, then and in such case the Company shall, within two years after they shall have been required to do so by the Municipal Commissioners, introduce the same mode of lighting for the city of Bombay, and apply the same as far as may be possible to the said 3170 lamps mentioned in clause 8 of this agreement: Provided always that such new method of lighting the streets shall be proved to be practicable in this country." We are not bound to move until we have had two years notice. Then there is an arbitration clause. I am happy to say that we are "at peace with all the world." We are going on very well with the Municipality and the inhabitants of Bombay. We do our best to give satisfaction. We sell a good article at a reasonable price, when you consider the great cost of freight and coal. I do not know that I have anything further to add to the remarks I have made. I will therefore move that the Directors report and statement of accounts now presented be received and adopted.

Major W. F. GORDON seconded the motion.

A SHAREHOLDER asked Mr. Stephenson if any arrangements had been made for lighting up the Crystal Palace by electricity.

Mr. NORTHOVER remarked that the great difficulty was the question of exchange. The Directors had not written off the entire amount.

The CHAIRMAN: We have written off £2500.

Mr. NORTHOVER said he was afraid the Directors could not offer them much comfort at the present time with regard to the exchanges. He understood there was likely to be an alteration in the currency to gold. The item of coal was rather heavy, but that, of course, would decrease. He was very pleased to hear that the Directors were turning their attention to the residual products. If there was any comfort to be derived by the Shareholders from the introduction of the electric light, it would be found in the direction of the residuals. The audit seemed to be a very necessary thing. It did not imply any want of confidence in anybody. Whenever they made any remark about gas and electricity, the whole of the Press, with the exception of the JOURNAL OF GAS LIGHTING, spoke adversely of gas. On the other hand, if any one wrote to a paper pointing out any defect in the electric light, no notice was taken of the letter. The other day, the writer of the Money Article of *The Times* alluded to the question of cost. It called forth, the next day, a letter from the Secretary of the National Electric Light Corporation, who said all recognized authorities admitted that gas was much dearer than electricity. He quoted M. Fontaine's book, p. 167, to show that it was in one instance 33 per cent. cheaper than gas; but he did not mention what was the price of the gas on which the calculation was made. As a matter of fact, it was in Paris 8s. per 1000, while in London the price was only 3s. 6d. Such statements were simply misleading the public. There was not an electric company in existence who would name a price for each burner. He knew a firm in London which wanted to have their house lighted by electricity as an advertisement. They applied to a person in Birmingham; but though the order had been given more than two months since, the lighting had not yet taken place. At first they were to have sixteen lights; then they were to have eight; now it was decided to have four or five; but it was very doubtful if it would be accomplished at all. If there were all these difficulties in the way, it was clear that electricity would not do all that the papers would lead people to suppose. Still, he thought that at some future time it would supersede gas as a means of lighting squares and large open spaces. The object of the formation of the electricity companies really was to sell their patent rights; but if the patentees were so conscious of the superiority of their systems, why did they not work them, and reap the profit themselves? The Hôtel and the Magasins du Louvre were lighted by electricity; but the principal of the Magasins du Louvre was also a Director of the Compagnie Générale d'Electricité, and the lighting was merely an advertisement. It was more to his advantage to disguise the truth, than to tell openly and candidly what it really was. He knew a gentleman who used the electric light for three weeks in a continental hotel, and when he came back to England he complained that his glasses would not do at all. Their power had to be augmented something like 70 per cent., and he was told that, if he contiued to use the electric light, he might in the end lose his eyesight altogether. He recommended the shareholders of gas companies not to part with their shares. Gas shares had been at far too high a figure, and he did not think they would ever again reach the same point; still, it would be very unwise to part with them.

Mr. PENNY said that some little time ago he attended an exhibition of the electric light by Mr. Werdermann, and what he then saw led him to the conclusion that unless some means were discovered of obtaining electricity at less cost than at present, it would never become the light of the future. It was not a light that any man could put about his house and leave in the care of his servants. There could be no store of electricity, and the instant the engine ceased to work, from any cause or accident, all the light would be gone. These two points alone convinced him that the gas shareholders had no need to trouble themselves very much. At the same time, he could not shut his eyes to the fact that last year their shares were saleable at £7, while now they only fetched £5 10s. He held £14,000 or £15,000 worth of shares in various gas companies, and he had not sold a single share; but if he had known that the price was going down, he would have sold out and bought more. The parts of the report which were not satisfactory were those relating to the loss on exchange and on residual products. It was quite beyond the power of any gas company to control the value of their residual products, or to control the exchange. He feared that the loss on exchange was likely to be permanent, unless some change was made in the currency, or the price of the gas was raised. It was, however, satisfactory to know that the operations of the Company, so far as the works were concerned, were all that could be desired. He regretted that they were unable to place anything to the reserve-fund. Their position this half year was £1500 worse than at the same period in 1877, so that all that was gained by good working, increased consumption, and the reduction in the price of coals, had been lost on the residual products and the exchange. In the last half year's statement of accounts the leakage was set down as 7½ per cent. He wished to know how it was that it had now risen to 12½ per cent. The London Gas Companies had reduced their leakage to a trifle over 6 per cent. To reduce the leakage was well worth all the cost of examining the mains, and putting down fresh services where necessary.

The CHAIRMAN: We have done that to a very large extent, with liberality and extreme care.

Mr. PENNY asked on what principle the £112 9s. 5d., written off the reserve-fund, had been estimated. He also wished to know from what source the insurance-fund, which now stood at £1814, was fed.

The CHAIRMAN said the Company took the risk upon themselves.

Mr. STEPHENSON said it was an underwriter's account. He was afraid that, although bad, the exchange had been exceptionally good last year, and that in future the rates might be lower than they were now. He did not believe anybody knew whether the rates would go up or down. He hoped and believed that the coke sales would be much better next half year. At the last meeting they had accumulated a very much larger stock of coke than any of them thought was prudent, and he hoped that they would never have so large a stock again in the yard of the Bombay Gas Company. They had lowered the price. It was valued in the account of the previous half year at a higher figure than they ultimately got for it, and the amount received from the coke during the past six months was exceptionally small in consequence of that circumstance. He hoped that at the next meeting they might not have a worse tale to tell as regarded the exchange. This year they had had remitted to them all the money they hoped to bring over. The lowest rate was 1s. 8⅛d.; but a great deal had been brought over at a higher price, and the Directors would now wait quietly until February or March, when they hoped the exchange would rule at its highest, before they brought over any more remittances. Mr. Penny had remarked that nothing was carried to the reserve-fund this half year. As a matter of fact, in the draft balance-sheet which had been submitted to the Directors by the Secretary, £500 had been put down to the reserve-fund; but the Directors thought it would be better to reduce the amount of exchange by writing off £2500, instead of £2000. That was the reason why nothing was put to the reserve-fund this half year. They thought it was right that the half year should bear its full proportion of the loss on exchange, and, therefore, they had charged the £2500 to the exchange. He could not satisfactorily account to himself for the leakage of gas; but it was a fact that, in the June half year, the leakage was always higher than in the December half year. He did not know whether that arose from the difference of temperature. For the half year ending June, 1875, the leakage was 13½ per cent.; June, 1876, 21 per cent.; June, 1877, 10·67 per cent.; June, 1878, 12·58 per cent. He understood that the Manager had lately been bringing in many of the governors of the lamps, and adjusting them, and some of them had been found to be out of order. On the other hand, the leakage in the December half year of 1874 was 8·94 per cent.; in 1875, 7·97 per cent.; in 1876, 7·48 per cent.; in 1877, 7·53 per cent. They had generally written off £200 every half year for preliminary expenses; but on this occasion they had not done so, simply because they had not the money to do it with. The £112 was so much per cent. on services, meters, fittings, tools, and other things of that kind. The insurance-fund was for marine risks. They had taken it upon their own shoulders, and had made a considerable profit. They began by taking £100 risk, and they had gradually got up to £500, paying themselves what they otherwise would have paid to the underwriters. It was a means of accumulating profit to them, and saved a great deal of trouble. If they had a loss, then they paid themselves. A question had been asked whether the Crystal Palace Company were going to use the electric light. They had intended to do so seven or eight weeks ago, but some difficulties had arisen because a very heavy preliminary outlay was necessary. For five lights in the Crystal Palace, an expenditure of considerably over £1000 was necessary.

A SHAREHOLDER: I heard it was £1340.

Mr. STEPHENSON said he had since heard that arrangements had been made for lighting the Palace by means of electricity. He thought there

had been a great deal too much said about the electric light. Although it might come into operation under certain circumstances and in certain situations, as at present developed it was totally inapplicable to private life. No doubt people would say, "But look at the progress of science." He was one who bowed down to science, and would not be surprised at anything that it might do in the future. He was quite ready to admit that at some distant day electric lighting might become general. But it might be that at some remote period men might fly, and that telescopes might be so improved as to enable us to see a fly on the back of a cow in the moon. All these things might be possible, but they were a long way off.

Mr. LOVEJOY asked what was the number of inhabitant housekeepers in Bombay, as compared with those who used the gas.

The CHAIRMAN said that was a question which no one on this side could answer.

Mr. STEPHENSON said the number of gas consumers was very small, as compared with the total population.

Mr. LOVEJOY asked what was the price at which the gas was supplied.

The CHAIRMAN said it was formerly seven rupees per 1000 cubic feet, but it had been reduced to six rupees.

The resolution for the adoption of the report and accounts was then put, and unanimously agreed to.

The CHAIRMAN proposed—"That the Directors be empowered to appoint a local Audit Committee of three gentlemen in Bombay, and they are hereby so empowered accordingly."

Mr. CROCKFORD seconded the motion, which was agreed to.

A vote of thanks to the Chairman and Directors terminated the proceeding.

EXETER WATER COMPANY.

A Special General Meeting of this Company was held on Tuesday, the 12th inst.—Mr. R. SANDERS in the chair—when the following report of the Committee of Management and the accounts of the Company were taken as read:—

In accordance with the instructions of the Shareholders, given to your Committee on the 26th of December last, to sell the undertaking to the Town Council on the terms then stated, your Committee proceeded immediately to carry the same into effect, and the necessary Act of Parliament received the Royal Assent on the 22nd of July last.

The account which your Committee have now the pleasure to present shows an amount in hand beyond what they had anticipated. Some delay has necessarily occurred in presenting this account, and your Committee would willingly have done so at at an early period, but the preparing the final account of a company that has been in existence for upwards of 45 years is a work requiring some time, and your Committee wished, if possible, to present one that would enable the Shareholders to make a final division.

To prevent further delay, your Committee have thought it advisable to furnish the present account, with the recommendation that a certain sum should be left at the disposal of the Committee, on the understanding that they would therewith undertake to meet all further demands, and thus enable the surplus to be at once divided and taken by the Shareholders in full. Should this proposal meet the approval of Shareholders, your Committee would propose that interest, at the rate of 6 per cent., the amount heretofore paid, should be now paid on the shares from Christmas to Lady-Day; this would take the sum of £700; and that a bonus of 12s. 6d. per share should be paid, which will absorb £1250, making together £2000, or, say, £1 per share. This will leave a sum of £654 5s. 5d. to be applied in discharge of ascertained liabilities to the extent of about £350, and the residue your Committee propose should be placed at their disposal on the terms before stated, to enable them to settle all claims that may hereafter be brought against the Company.

In making this their final report, your Committee wish to return their thanks to the Shareholders for the unvarying support that they have always received from them in conducting the affairs of the Company.

The CHAIRMAN, in moving the adoption of the report, said that on looking back upon the transfer of the Company's works to the Corporation, he thought the Town Council had made a particularly good bargain; because, although for a time they had given 8 per cent. upon the capital, and had agreed to take over the shares at £47 each, it should also be remembered that the Council could raise the money at a much lower rate than the Company could. In addition to that, they had the advantage of being able, under the Act of Parliament, to charge a higher price for water than the Company were empowered to charge. It might not appear so on the face of it, but in substance that was the fact; and if the charges were advanced, he had no doubt that the public would pay them more cheerfully to the Council than they would have done to the Company, as, after the interest on the debt had been paid, the balance would go to the benefit of the city generally. He thought the town would also find that they had as good and pure a supply of water as could be found in any place in the kingdom; and he did not think complaints would be made in future about the want of water at fires, and so on. Looking at the other side, at what sort of a bargain the Company had made, he said he thought it was a very fair bargain, and, taken altogether, a very good one. The Company were established, in the first instance, as a sanitary measure, and had up to the last been worked in the interests of the public, without any attempt to make a great mercantile success. They had always been content with a fair rate of interest, and that they had received. The Council had given them 8 per cent., and £47 per share when they paid them off, and up to the present they had been receiving 6 per cent. Had they retained the undertaking, they must have expended a large sum in extending the works. They would not have been able to raise the money at so low a rate as the Council, and they would always have been liable to hear from persons that the water was not pure, and so on. If they looked at both sides, he thought they could say fairly it was a reasonable bargain, and with that they should be content. He could not compare the balance-sheet with any other, because it represented a general winding-up of the whole concern, but he thought he might say it was a satisfactory one. It left a sufficient balance to pay the 6 per cent. they had previously received, and a bonus of £1 per share. There was a balance of £300 besides, which was reserved to meet any demands that might be made; and at the end of 12 or 18 months it was proposed to divide the surplus amongst the Committee of Management. It was for the meeting to say whether they would take that as a final account, or whether they would leave the matter open, and at some future time get another 1s. or 1s. 6d. per share. In order to place the question regularly before them, he moved that the report and statement of accounts be received and adopted.

Mr. DAVY seconded the motion.

Mr. HUTCHINGS said that £500 was granted to the Directors at the last meeting, and now it appeared there would be an additional £500 at their disposal. He would therefore propose that out of this sum £100 be given towards a testimonial to the Chairman, in recognition of his urbanity and the valuable service he had rendered to the Shareholders, tending to the benefit of the citizens at large.

Mr. DALE seconded this proposal.

The CHAIRMAN said this was, of course, very flattering to him, but he hardly saw how he could put the resolution to the meeting. Although he had no doubt in his own mind that there would be a surplus, yet at the present moment they did not actually know that there would be one. But assuming that there was a surplus, he should not like to be put in the position of being a recipient of a large sum against the other members of the Committee.

Mr. HUTCHINGS said he did not think the sum would be at all too large, remembering the long service of the Chairman. He would alter his resolution to the effect that the grant be made supposing that at the end of 18 months there was surplus in hand

The CHAIRMAN said if the Shareholders considered it right to make any suggestion of this kind, he thought that the best plan would be to recommend that when any amount became divisable, the services of the Chairman should be specially recognized.

Mr. BREMRIDGE said he thought the report had better be adopted as proposed, and then the Committee would be only too happy to fall in with the spirit of Mr. Hutchings's proposal.

Mr. HUTCHINGS said he was acting in this matter at the suggestion of other Shareholders, and he thought that there should be a fixed sum of £100 given out of the surplus to the Chairman, and there should be a fixed time—say at the end of 12 or 18 months.

After some further discussion, the report was adopted, and also the following resolution—"That in the distribution of any surplus left in the hands of the Committee of Management, they be requested to specially consider the services of the Chairman."

The CHAIRMAN expressed his thanks to the Shareholders generally for the manner in which they had always treated him, and to the Committee of Management for the support they had ever given him.

The proceedings then terminated.

SOCIETY OF ARTS.

The First Ordinary Meeting of the Society of Arts for the present session was held on Wednesday last, when Lord ALFRED CHURCHILL, Chairman of the Council, delivered an Address, from which we extract the following:—

A special work which the Council have on hand, and which it is intended to carry on, is that comprehended in the Congresses on Health and Sewage of Towns, on Water Supply, and on the teaching of Domestic Economy in the elementary schools of the kingdom. Already, as you are aware, there have been three Congresses or Conferences held under the title of "Health and Sewage of Towns," and with marked success. The Water Question, one of national interest, was taken up on the suggestion of His Royal Highness the Prince of Wales, the President, as embodied in his letter addressed to the Council in January last, and it formed the subject of a separate Congress. This question is, however, so important in a national point of view, and still excites so much interest, that the Council have—wisely, in my opinion—determined that it shall not be dropped, but shall take a place in the programme of the next Congress on "Health and Sewage of Towns." The scope of the fourth Congress, to be held in May next—following the advice of Mr. Stansfeld, the active President of it—will be extended so as to embrace the discussion of all these subjects; interpreting "health" in its broadest sense, and not merely as connected with the sewage of towns only. In accordance with the resolutions passed at the Water Supply Congress, the Council will endeavour to find a convenient opportunity of bringing before Her Majesty's Government the absolute necessity of dealing with this question in a national sense, and taking steps for rendering "the great natural resources of the kingdom," to use the words of His Royal Highness, available "for the general body of the nation at large." It is evident that, in dealing with this question, the saving of our rivers from pollution forms a very important element, but not the only one, as other sources of supply have to be dealt with. Doubtless you are aware that an Act has been passed with a view of preventing this pollution of rivers; but, unfortunately, its provisions are so hampered with conditions of all kinds, to say nothing of its permissive character in many respects, that, for all practical purposes, the Act may be considered as but a dead letter. The evils have been repeatedly pointed out by Royal Commissions and Parliamentary Committees, and the time has arrived when something practical should be taken in hand. Difficulties no doubt exist, but it is the duty of a statesman to overcome difficulties, and I think it can hardly be said that in the present case they are insuperable. But rivers are not our only sources of supply; lakes, both artificial and natural, as well as underground waters, must be resorted to. Each district has its own specialities, and needs its own special treatment, but this does not preclude the adoption of a general system, sufficiently elastic to meet the varying requirements of each. Local administration, with its local knowledge and local interests, might, as it seems to me, fairly be entrusted with the general treatment and conservancy of the river basin, and with the consideration of the claims of each district on the sources from whence a supply might be taken; whilst a supervising authority might be invested in the hands of a competent central body, to advise, control, and direct. The central body might collect into one focus all the information already accumulated in reference to these various matter, but buried, so to speak, in Blue-books, and other stores of information, and, where needed, seek by the necessary surveys and examination such further information as may be required from time to time to supplement what is already known. It should also be prepared to supply such data, on application from any district authority needing it. Whilst on this subject, I may state that the Committee on Water Supply have had prepared for reference a catalogue, or digest, of all that has hitherto been done in the way of inquiry and collection of information on this subject. The information is at present scattered in Parliamentary Blue-books, various official reports, transactions of societies, and other works. Such a digest, or collection of information, has never hitherto been prepared, and it cannot fail to be of great assistance to all interested or engaged in investigations connected with water and water supply. Whilst speaking of the pollution of our rivers, let me advert to the Thames, into which we are pouring all the filth of this Metropolis, whilst other towns are precluded by Acts of Parliament from casting their sewage into their neighbouring streams. Public opinion at this time points to this anomaly, but whether anything will be done to remove it remains to be seen. How this removal should be effected, and what are the details which should be adopted, it is not for me to say; it is clear, however, that discussion on all such matters cannot fail to assist in the solution of a question which, I venture to think, cannot much longer be postponed.

While, however, the sewage question is necessarily involved in the purity of our rivers, there is another aspect in which it deserves our most serious attention—viz., its effect upon the health of our population. To this, comparatively little attention is given—though I am glad to observe that public interest is being aroused—and neither the builders of houses nor those who live in them are sufficiently alive to its importance. We construct costly and efficient sewers, but, as a rule, we take little care how we make use of them. We connect our houses with them in such a way as to bring the unhealthy gases direct into them. It is not sufficient that a town should be well drained or well sewered; these are simply means to an end, but the end is too often neglected. Unless the house arrangements for connection with them are carefully made, it may be safely stated that the very sewers may become a curse rather than a blessing. It is to be feared that such is the case, to a very considerable extent, in a large number of our towns, not omitting the Metropolis. Too little attention has hitherto been paid to this matter. The occupier takes his house upon faith, and not until the deadly effects of imperfect connections manifest themselves, by impaired health on the part of himself or his family, is any heed given to the cause. It may be that no actual case of

typhoid or diphtheria manifests itself; but disease is there, nevertheless, insidiously pervading all subject to its influence, and bringing on a lowered state of vitality, which renders the sufferer less capable of resisting the attacks of any unfavourable circumstances which may arise. An increased death-rate is the result. A greater supervision in the first instance is needed to secure the proper connection of the house with the drains. It may be said this is so obviously a matter of interest to the occupier, that he will look to it himself. Experience shows that such is not the case. In the first place, the public generally are not alive to the evil; and, in the next place, in the great majority of instances, the occupier has nothing to do with the building of the house, and even if he has, or desires to investigate before he takes his house, the subject is so little understood, and the difficulties of getting anything like accurate knowledge of the state of the drainage—necessarily, from the nature of the case, covered up—so great, that the occupier takes his house upon faith, and suffers accordingly. With a view of diffusing information, especially in connection with this subject, the Council have a proposition before them for establishing a Sanitary Section, with a Committee especially appointed to take charge of it, who, in the intervals between each Congress, shall meet, and, amongst other things, make such arrangements as may be calculated to aid members of the Society in obtaining information connected with this special subject, as well as reliable reports as to the sanitary condition of their houses. It remains yet under consideration whether this proposition will be adopted.

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It may be expected that, in addressing you on the present occasion, I should say something on a subject which, at this time, is exciting great attention—viz., the electric light; but, inasmuch as a paper on this subject is coming before you shortly, I will content myself with pointing out that, though it has only of late been brought specially before the public in this country, it has been in actual commercial use on the other side of the water—in France—for upwards of two years. So long ago as the winter before last, several factories and commercial establishments were successfully using it, and have continued to do so since. Though, no doubt, there is considerable room for further invention before it can come into general use, especially for domestic purposes, the trial has been carried on so long in Paris, that it may be said to have passed beyond the range of experiment. How far it will, in the end, supersede gas, is a matter on which I will not venture to prophesy; but this, I think, I may, with a tolerable approach to certainty, say, that for a very long time to come gas will hold its own, the more especially as we are told that large improvements in its manufacture and use are at hand, with a view both to cheapness and improved illumination. That the electric light for many purposes is available at the present time, and will be brought largely into use, there can be but little doubt, whilst its beauty, efficiency, and brilliancy must be admitted on all hands.

WEST OF SCOTLAND GAS MANAGERS ASSOCIATION.

(*Concluded from p. 753.*)

CHARGING CONSUMERS OF GAS WITH DEPOSITS.

Mr. JAMES M'GILCHRIST (Dumbarton) said:

Mr. President and Gentlemen,—Although the remarks I am about to make will not ventilate any of the many great improvements that have been, and will be made in the manufacture of coal gas, before it is superseded by the electric light, I know they will be profitable if I can only show how to increase the profits on the gas registered at consumers meters, by advocating, and causing you to adopt, the system of requiring deposits from all consumers. This practice has not, to my knowledge, been discussed before at a meeting of gas managers, and, besides having the merit of being new, it will, doubtless, give rise to an interesting discussion. The question of consumers deposits is one of considerable importance to the majority of the Members of this Association, who have not only the manufacture and distribution of gas to superintend; but also the collection of the "bawbees" to vex themselves with. Therefore, without further apology for bringing this subject before you, I will begin by remarking that the systems adopted by companies and corporations with regard to their consumers deposits, are as varied as the salaries they pay their Managers. If you admit this, I shall have little difficulty in convincing you that both have great room for improvement, more especially the latter. The JOURNAL OF GAS LIGHTING has more than once referred to the advisability of charging money deposits from all consumers, and giving a fair per centage in return; but, at the present time, every company and corporation have a system peculiar to themselves, which, unfortunately, in most cases, is attended with very unsatisfactory results. In one town deposits are only charged from suspicious persons; on the principle that is, I fear, too often adopted, of judging the man by the coat he wears. This, besides being a poor test of a man's honesty or ability to pay, is harsh—nay, unjust. Why tax one consumer and not another? If we have a monopoly, we should not abuse it by favouritism. It is not proper that a manager or collector should be placed in the position of judging between man and man. He must make many mistakes, for who can tell, without previous experience, the just from the unjust? Besides, such a position is apt to endanger the Manager's popularity. In another town, deposits are only charged from consumers who occupy houses of one or two apartments. On what argument this system is upheld I know not; but I know it causes a great amount of dissatisfaction among the consumers who pay deposits. The argument proceeds thus: "Why do you not charge my next-door neighbour a deposit?" Gas man: "Oh, you know, we must draw the line somewhere." "Why draw it between me and my next-door neighbour?" the consumer replies. "Am I not as honest, &c., &c., as he?" And so the footing between gas maker and gas consumer becomes, as time rolls on, bitter and more bitter, and the bad debts accumulate, through consumers who live in houses of more than two apartments failing, removing, or some other cause; and the consumers who pay deposits are compelled also to pay a proportion of these bad debts, not only in an increased price for gas, but from the interest the gas-maker has on the deposits. I could go on enumerating a dozen other systems founded very much on the same unsatisfactory basis as those already mentioned; but I have said enough. You know them all as well as I do. Gentlemen, I cannot think a company or corporation are doing their best for their consumers, unless they require deposits from all. Without this, you simply allow the one consumer to pay the other's debts. In a tailor's or baker's business this is undoubtedly the case; but the tailor or the baker has the privilege of selecting his own customers. Seeing the gas-maker has not this privilege, it is his duty to protect the public, and wipe his bad debts from off his books. You will excuse me for supporting my argument by the following facts. (I may state that this paper is not written for publication, otherwise it might be thought that I was blowing my own trumpet.) In the first year's working of the Dumbarton Corporation gas undertaking (in 1873-74), when deposits were charged only as the Manager thought fit, they had, at the end of their financial year, the 1st of August, about 4¼ per cent. collected of the amount of arrears. This seemed to me to be an enormous sum, and in the following year I advised the Gas Committee to charge deposits from all consumers. The Committee brought the question before the Town Council, who adopted a motion to the effect that all persons wishing to be supplied with gas must lodge deposits at the following rates:—5s. for a single apartment, 7s. 6d. for two apartments, 10s. for three apartments, 15s. for four apartments; larger houses at corresponding rates. The amount for shops and other places of business to cover four months winter consumption. In the year 1874-75 we reduced the arrears to less than 1¼ per cent. At the end of 1875-76 we had about 19s. per cent. of arrears: in 1876-77 we had about 10s. per cent. of arrears; and at the end of last year (1877-78) the system had worked so well that we had only £2 14s. 7d. of arrears, or rather less than one-seventh per cent. These results, gentlemen, in my opinion, speak volumes in favour of the system I advocate, and I have no hesitation in recommending every company or corporation who are troubled with many arrears to adopt it, and I am confident they will obtain the same results. A little opposition would, in all likelihood, be raised to it at the first; but in a few months it would all be lulled to sleep, and when those who opposed it understood its object, they would say, "It is not a bad thing after all." We give 2½ per cent. interest on all amounts deposited for not less than two years; but I am strongly of opinion that the rate of interest should be raised to 4½ or 5 per cent., which would make the deposit a fair investment to consumers; and as the company or the corporation pay about the same rate for borrowed money, they would not lose anything in that respect, but gain that which at the present time is lost through consumers not having deposits. Besides, with deposits, the collector has not the same amount of trouble in hunting up defaulting consumers. In conclusion, gentlemen, if any of you think of recommending this system to your Directors, and if it is introduced, never make any exceptions—not even of your Provost or Chairman. They furnish you with an excellent argument when any consumer is endeavouring to give a reason why he should be exempted. You reply that the Provost had to pay his deposit, like any other consumers, and after this the customer will invariably ask, "How much?" I trust my few hurriedly got-up sentences will induce you to express your opinion on this subject of consumers deposits.

The PRESIDENT: Here is a subject of great interest to every one of us. We all want to do away with bad debts, as far as possible; at the same time, having a monopoly of gas, we should be careful not to make too harsh demands upon gas consumers. Companies are different from corporations. In the case of corporations, the gas-works belong to the ratepayers, and a corporation can do certain things which will be for the public weal which a company could not do. Besides, the people would stand the imposition of laws and regulations by a corporation, when they would not recognize them if a company were to insist on them. I shall be glad to hear the opinion of the meeting on this question of taking deposits. No doubt it has its advantages, but many things that are advantageous are not always expedient.

Mr. FAIRWEATHER: One thing I am pleased with, and that is with respect to the interest allowed on deposits. I think that 4 or 5 per cent. ought to be allowed, so that companies and corporations might be in the position of saying that they did not wish to make profit by such deposits. In my district, interest is not allowed—the principal merely being given up when a consumer leaves; so that the people come to the conclusion that the Gas Company make a great deal of profit out of the deposits, and this is very prejudicial to Company. Now, this feeling would be remedied to a large extent by allowing interest. I am very pleased indeed with the tone of Mr. M'Gilchrist's paper.

Mr. MITCHELL: It is now 20 years since our Company adopted the system of deposits. At the outset the amount fixed was 5s. for each depositor, and no interest was allowed. In 1868 the amount was raised to 7s., without interest; and in 1877 the sum was still 7s., no interest being allowed; but if the consumer lodges 10s. he gets interest at the rate of 5 per cent. This interest, however, is only given when the money has been deposited for six months or more. The system has been very beneficial to the collector Our deposits range from 5s. to £5, and I may state that consumers prefer to leave 10s. deposit and get interest, rather than 7s. and have no interest.

Mr. BRODIE: I think the principle of taking deposits is wrong altogether. If I were to ask for a deposit from a gas company, for work which I might be employed to execute, offence would probably be given, and business might be ended. In doing business we trust people, and if we find that they are suspicious characters, we insist upon security. Why should a gas company be in any other position? I think the imposition of deposits is unfair to people who cannot at the moment pay their way. They are asked to pay for a thing which they do not possess.

Mr. NELSON: For once I quite agree with what my friend Mr. Brodie has said. I do not see why companies should occupy an isolated and preferential position over other people. The fact that they have a monopoly in the supply of certain articles should make them more generous, and I think it is ridiculous to charge deposits, more especially as it bears so heavily on the honest poor consumer. It is a serious matter for a labouring man who occupies a single apartment, and who has a severe struggle to obtain the necessaries of life, to be forced to pay 5s. or 10s., as the case might be, before he can get gas. He may not be prepared to lay out that amount. In another sense it is a great disadvantage, inasmuch as it operates materially against the general diffusion of gas throughout a city, more particularly a manufacturing city, when there is so large a proportion of small houses. In charging deposits, I think that companies stand in their own light. In my opinion, they ought rather to offer inducements to poor people to take the gas, as they do in the North of England. I know also that for every shilling companies lose by poor people, they lose ten pounds by those professedly rich people who dwell in mansions. Therefore I think all gas managers should set their companies against the adoption of such a system.

Mr. FULLERTON: In my opinion, the discussion of this question is out of place in a meeting of this kind, seeing that it is a mixed body; there being parties here representing both companies and corporations. I do not think the question should be discussed on its merits at all, because in places where the works are liable to be taken over by the corporation, it would be difficult to put the system in force. It would be much better to leave every one to manage his own business.

The PRESIDENT: We could scarcely expect to be unanimous on any matter; but I think this is a subject fit for discussion, because where parties differ we come to hear both sides of the question. I coincide very much with what Mr. Nelson and Mr. Brodie have said.

Mr. RENFREW: I beg to differ from Mr. Nelson. So far as the paper goes, it makes the charging of deposits universal. Mr. Nelson takes it up as if the deposit were only to be charged from working men, while the rich were to be exempt.

Mr. NELSON: I did not say a word about exempting the rich. On the contrary, I should insist on their being charged deposits in preference to the poor.

Mr. M'LEOD: This is one of the subjects with respect to which our sympathies would go with persons holding views opposed to those of Mr. M'Gilchrist; but our practical views are in his favour. We must deal with human nature as we find it, and we have two alternatives, at least in a large district such as Glasgow. Perhaps in a dull time like this you would find that there would be fewer meters taken up by the poor people if you were to insist upon these deposits; but, at the same time, I would certainly go against the principle of insisting upon deposits, were it not that by getting

the poor people to deposit 5s. or 10s., and giving them, say, 5 per cent. upon their money, you teach them an important lesson in social economy.

Mr. JEFFREY: I have had very little experience in the way of deposits. I do not suppose that Mr. Brodie has lost much through his dealings with gas companies; but if he had to manage gas-works and not take deposits, he would find it a different thing at the end of the year. I would not require deposits from all parties. Our plan is to charge new consumers until we know them, and after that they can be paid back, say in twelve months or two years, as the case may be. I should be in favour of deposits, but not from every person.

Mr. MONK: There seems to be a great variety of opinion as to the question of insisting upon deposits. Some companies take deposits and give no per centage upon them, and others pay from 2 to 5½ per cent. While this variety of feeling has been expressed, we must all sympathize with Mr. M'Gilchrist on the object he has in view. If deposits are to be levied at all, there should be no distinction whatever made—no respect of persons. There are a great many reasons why there should be deposits, and those who have to do with the collection of accounts will understand that as well as I do. In the case of Lanark, if we were to insist upon enforcing the deposit system, we might put an end to more than a third of the consumption. As it is, in collecting our accounts the loss is never more than 15s. or 16s., and sometimes as low as 14s. per cent. No doubt a great deal of trouble is incurred which the deposit system might obviate, and it might be introduced where it would be considered an advantage; but this very much depends upon the trade of the town. It might do very well for a flourishing place like Dumbarton, but it would never do in a place like Lanark. I think the discount system is a preferable one.

Mr. DALZIEL (Kilmarnock): This question has been under the consideration of our Committee, but there seemed to be a feeling that the insisting on a deposit would bear very hard upon the poor, but there is not the slightest doubt that it would be a great advantage to the collector. We have 3000 or 4000 consumers, burning something like 14 millions, and other 1400 consumers, who burn something like 28 millions. If we were to insist upon a deposit, I am afraid it would very much reduce our collection. Now, our average loss upon collection does not amount to one-half per cent. I think we should only take deposits from strangers. If you have a vigilant collector you will not lose much. While I think the deposit is a security to a company, still to insist upon it would bear hard on poor people.

Mr. FAIRWEATHER: I think the general opinion is that deposits should not be charged from consumers who are already in the town, but from new customers, and that they should be required, I presume, from rich and poor alike. I do not think any one is making a great sacrifice if he leaves a deposit, provided he gets 5 per cent. upon it. It is the duty of companies and corporations to see that rules are laid down in regard to the deposits, because corporations only exist in the interest of the public. I think the deposit system is the best means of obviating bad debts.

Mr. RICHMOND (Whitburn): To me the discussion seems to have been consumers *versus* private companies. I can hardly agree with Mr. Brodie and Mr. Nelson that it is wrong in principle to charge deposits from a consumer when he wants gas; but I think it is unjust to working men, who have not the money to spare. The only redeeming point about the system is that 5 per cent. is given upon the deposits. If deposits are exacted, they should be upon the whole of the consumers. I object to the statements made by Mr. Brodie. If a gas company require work to be done, I do not see that a deposit should be insisted upon from them. I should take the work, and consider them to be good for the amount. I do not think it is right that it should be left to the Manager to say whether deposits should be charged.

Mr. BROWN: I differ from the last speaker. We know the standing of gas companies, but we do not know that of private individuals. We can make inquiry, and find out whether a gas company are worthy of credit. If we were to make the same inquiries in regard to private individuals, it would be a serious matter for the collector. I hardly agree with the system, but I think the sting is taken out of it when all have to pay. I agree with most of the speakers that this is a subject that should be discussed at a meeting such as the present, because it is a question of serious importance with respect to the profits of a company, and if it were introduced it would leave the Manager more time to devote to his other work.

Mr. M'GILCHRIST: I am obliged to the gentlemen who have expressed their opinions in regard to my few remarks. I did not come here supposing that they would be wholly agreed to. I brought the subject up for discussion, in order that we might determine which was the right side, and I think that the majority of the persons present do not agree with Mr. Brodie. He thinks the system a mistake. I am astonished at this, because he has been dealing with honourable people since he started business. Had Mr. Brodie suspicious parties to deal with, I am sure he would say, as he said of the doubtful person, "Get security." The great advantage of making deposits general is that the Manager or Collector is not bound to make invidious distinctions as to who should or who should not pay deposits; because when all are made equal, no one can complain. Mr. Richmond would charge rich people, and let the poor people off. That would be a mistake, because it is through the rich and large consumers that we are able to sell to the poor at a lower rate. If the system of not charging deposits from each individual were adopted, the rich man might come and say, "I have as much property as would buy the whole of your gas-works;" and if he were allowed to go free, the poor man would undoubtedly complain. I have replied to all, that the deposit is a very small matter, and it is for the benefit of the consumer that it is made, because, if the deposit were not insisted on, there would be an increase in the bad debts, which consumers would be required to make good. Altogether, I do not see how we can get out of the difficulty without charging deposits from all consumers. Mr. Fullerton did not consider that this was a question that should be discussed here, because there are so many different opinions; but I think it is just as well that every one should express his individual opinion. I heartily agree with Mr. M'Leod that we are teaching the people social economy when we charge deposits and give a per centage on those deposits. He is a very poor man indeed who is not able to leave 5s. or 7s. 6d. on deposit, with the prospect of 5 per cent. return. I cannot see how it is a hardship for any man who uses gas to leave a small amount as security. No doubt a great many people agree with Mr. Jeffery that it is correct only to charge new tenants; but, unfortunately, it often happens that people in good positions come down, and the Company suffer serious loss, so that argument will not stand. As to Mr. Richmond, he can select his consumers; but, unfortunately, gas manufacturers have to take every one. I have to thank you for the way in which you have listened to my remarks, and to say that if you charge deposits you will all agree that the system is sound in principle and correct in practice.

The PRESIDENT: I beg to move a hearty vote of thanks to Mr. M'Gilchrist. In conclusion, I have to say that we have been indebted to Provost Sturrock and the Town Council for the use of this room. I therefore propose that we accord them a vote of thanks for their kindness.

PLACE OF NEXT MEETING.

It was agreed that the next meeting of the Association should be held at Coatbridge.

On the motion of Mr. MITCHELL, a hearty vote of thanks was accorded to Mr. Stewart, and the proceedings terminated.

In the afternoon the members of the Association dined together. The President occupied the chair, and the duties of croupiers were discharged by Messrs. Nelson and Brown. A very pleasant evening was spent.

ON THE WATER OF THIRLMERE.

By Mr. H. GRIMSHAW, F.C.S., and Mr. C. GRIMSHAW.

[A Paper read before the Manchester Literary and Philosophical Society, Tuesday, Oct. 15, 1878.]

The samples of water of which the following details are given were taken by us on Aug. 23, 1878, from what may be termed the "upper nd lower lakes," meaning above and below the narrow waist of the lake, where crossed by the small bridge. The first taken was the "lower" sample, which was obtained on the west side of the lake about 20 yards below the bridge. The "upper" sample was taken about three-quarters of a mile below the head of the lake on the east side. The results of the two samples, so far as position affects them, should therefore be sufficient to show any possible divergency which could occur in the quality of the water on that account. These two positions are shown upon the sketch map accompanying the paper.

The two samples were analyzed separately, except as regards the amounts of ammonia (determined 28th of August, 1878) for which equal parts of each sample were taken, as there was not a sufficient quantity for separate analyses.

The following are the numbers obtained:—

Free ammonia—half a litre of water distilled took 1·5 cubic centimètres standard NH_4Cl.

Albumenoid ammonia—half a litre of water distilled took 3 cubic centimètres standard NH_4Cl.

Total hardness—70 cubic centimètres water took 1 cubic centimètre standard soap solution.

Permanent hardness—70 cubic centimètres water boiled one hour and made up took 1 cubic centimètre soap. (The ammonia analysis common to both samples, hardness same in each.)

Solid matter—100 cubic centimètres lower sample gave 0·0045 gramme residue, which blackened on ignition, and lost 0·0025 gramme.

Solid matter—70 cubic centimètres upper sample gave 0·0022 gramme residue, which blackened a little on heating, not so much as lower sample, and lost on ignition 0·0007 gramme.

Chlorine—25 cubic centimètres lower sample took (1st) 0·25 cubic centimètre, (2nd) 0·25 cubic centimètre standard $AgNO_3$; 25 cubic centimètre upper sample took (1st) 0·15 cubic centimètre, (2nd) 0·15 cubic centimètre standard $AgNO_3$.

The foregoing figures give the following tabulated results:—

	Grains per Gallon.		
	Lower Samples.	Upper Samples.	Dr. Roscoe's.
Total solid matter	3·15	2·20	1·4500
Mineral matter	1·40	1·50	—
Loss on ignition	1·75	0·70	—
Total hardness	1·00	1·00	0·5000
Permanent hardness	1·00	1·00	0·5000
Chlorine	0·70	0·42	0·4200
Nitrogen as nitrates and nitrites	—	—	0·0247
Free ammonia	0·0021		—
Albumenoid ammonia	0.0042		0·0049

The "ammonias" expressed in parts per million are 0·03 and 0·06 respectively; the chlorine equals 0·07 and 1·16 grains per gallon of salt.

The water was very clear and sparkling, practically free from sediment, and its reaction perfectly neutral to litmus. There was no reaction for heavy metals, copper, lead, iron, &c., although we observed that there ran in close to the top of the lake a small stream of a very turbid milky appearance, upon which is situated, on the side of the hill towards Helvellyn, a lead mine; which stream could be traced by its colour for at least 20 yards into the clear water of the Mere. These mining operations, we understand, will, of course, be completely done away with on proceeding with the water scheme.

We may offer the following brief remarks upon the above analysis of the water of Thirlmere. In the first place it is evident that the water is one of the very purest description found in nature, not being surpassed by that of any locality in Great Britain of which analyses have been published.

As regards its use for manufacturing purposes, it practically could not be improved. For drinking purposes, also, it is perfectly free from anything which could be considered objectionable—of either an organic or mineral nature—though we are not prepared to assert that a water, considered "solely" as to its suitability for this purpose, attains any particular advantage from having its amount of lime salts lower than some ten or so grains per gallon, though, doubtless, it is better that this should be very small than that it should be excessive. To give a fuller indication of the quality of the water of Thirlmere, we have taken the liberty of appending to our results those observations by Dr. Roscoe, from a sample of the same taken in February of this year. Now, it will be seen that there is a certain difference between the results of these samples, more especially with regard to our "lower" one. On examination, however, the difference will be seen to be one of "degree" only, and not of "kind," and entirely confined to the mineral, and, in this case, the least important items. It is explained by the fact that the rainfall some little while before the taking of the respective samples had been very different, the longest period of dryness, perhaps, which we have had this year having occurred just before the taking of those of the present paper. We should, therefore, expect that the solid matters would be higher, and find them to be so by about 1½ grains per gallon, the total in either case being insignificant. It would, perhaps, not be wide of the mark if we said that the analyses of Dr. Roscoe and ourselves show the water at its best and its worst, as regards ordinary variation. This variation, it will be seen, is not greater than may occur at the same time in different parts of the lake, as shown by our upper and lower samples, these analyses also indicating a slight gradual increase of dissolved material as we approach the foot of the lake, where the solvent action of the water upon its bed will have accumulated, and the fresh water received from the tributaries is lowest in amount. This gradation of quality will, of course, only be true of the lake under its present natural condition.

The variation of the organic constituents of the water at the different dates is not so marked. From the behaviour of the solid matter during ignition we should say that the carbonaceous matter, of which there is a perceptible amount, is almost entirely of a vegetable nature.

THE PARIS GAS COMPANY'S EXHIBITS AT THE INTERNATIONAL EXHIBITION.

By Mons. L. de Vannes.

[Translated from *Le Journal de l'Exposition.*]

Not very far from the Seine entrance to the palace in the Champ de Mars, and in close proximity to that portion of the building devoted to the great metallurgic industries of France, stands an elegant pavilion, erected under the direction of the Paris Gas Company, for the exhibition of the materials and apparatus employed in the manufacture of illuminating gas.

First of all our eyes are attracted by immense blocks of coal, the raw material from which all the ulterior products are obtained. This coal is procured from England, Belgium, and the North of France, and is delivered in train-loads day by day into the various stations of the Company. It is difficult to conceive by what kind of transformation these great black masses are made to produce the beautiful colours which adorn the other end of the pavilion. But let us proceed with order.

Inside the pavilion we find first, in the way of historical information, a model, constructed to one-fifth the natural size, of the simplest form of gas-oven—a single retort—the date of which is 1821; then we have, successively, settings of two (dated 1842), three, five, and seven retorts, with ascension and other pipes, and all the various accessories.

Another very carefully made model gives us a correct idea of the way in which the most recent settings of eight retorts are constructed, and of the method of heating them, for which the Siemens process has certain advantages. By the aid of openings judiciously arranged at certain points of this model, we are enabled to see what is going on inside when the setting is in operation.

In order to illustrate as clearly as possible the course taken by the gas from its generation in the retort to its exit from the gasholder—to the moment, in fact, when it is about to enter the distributing mains—drawings of the whole of the apparatus employed in gas-works have been prepared to a scale of 1-20th of their natural size. Other drawings represent the machinery employed in the treatment of the tar, and in the manufacture of retorts and other refractory articles.

The construction of gasholders may be studied with considerable interest, two exceedingly pretty models in wood, 1-50th of the usual size, showing how, by means of the timber trussings, the roofs of holders of various dimensions are supported.

At the farther end of the pavilion there is a glass case containing specimens of all the secondary products obtained from the coal distilled in the Company's works. These are arranged in the natural order of their manufacture. Near them some very brilliant coloured silks, and woollen goods of various shades, testify to the great variety of colourings that other industries derive from tar. The sulphate of ammonia shown in this case is obtained in the process of condensing the gas, and its fertilizing properties are well known to all agriculturists.

Another case is devoted to the manufacture of artificial alizarine—which furnishes us with the beautiful madder colour—and to the treatment of the benzoles and phenic acid.

Between these two cases we find a model of a condenser, a station governor, and one of Dumas and Regnault's photometers, which is the instrument employed by the Municipality of Paris for testing the illuminating power of the gas. These complete the list of apparatus required in all large gas-works.

The various kinds of apparatus for heating by coke are exceedingly well displayed in this pavilion—ranging as they do from the largest-sized marble stoves down to the smallest and simplest kind in use. The specimens exhibited are all more or less ornamental in design.

Coke also figures in its well-known form, as also in very hard silver-grey lumps, such as are employed on the railways and for metallurgic purposes. And here we must not omit to mention the compressed fuel which is manufactured from breeze, specimens of which are shown in this case in the form of blocks. These blocks of fuel are used by the Company for heating their steam-boilers, by the aid of revolving fire-bars, as exemplified by a small model.

A brief reference to graphite, a substance which forms on the interior of the retorts, and which, on burning, gives out a very high degree of heat, brings us to the end of the list of combustible materials obtained from the distillation of coal.

The three most widely-known gas-engines—the Lenoir, the Otto and Langen, and the Otto—occupy the centre of the pavilion. The last named is a specimen of a new kind of engine worked solely by gas, and performing its functions regularly, noiselessly, and without shock, and we believe it is destined to render eminent service in Parisian industry.

On the walls on one side of the pavilion are arranged all the refractory articles—retorts of all shapes and sizes, ovens of various kinds, and, as a specimen of retort-setting, an exact full-size representation of an oven with seven retorts.

The side of the building facing the north is occupied by specimens of some of the main-pipes used by the Company, so arranged as to show the methods adopted for cutting pipes under pressure, and also for making junctures, without interrupting the flow of gas or running the risk of fire. There are likewise a large number of lead joints, the workmanship of which causes some astonishment, even to persons engaged in the business. Other specimens of lead-work are shown as illustrations of the manner of jointing mains, which, from having to cross a sewer, or from some other cause, are liable to get out of level. The canvas bags placed along the mains are ready for filling in the event of a main having to be suddenly cut, as frequently happens in Paris.

To sum up, the whole of the exhibits have been very carefully selected and arranged, and are worthy of the great Company who have charge of so important a branch of the public service as the supply of light.

The ordinary visitor to the Exhibition will find here the wherewithal to satisfy a passing curiosity. He who is desirous of increasing his knowledge will follow with pleasure all the various details of the production of an article so useful and so generally employed as gas, and his wonder will be excited at the number of bye-products which are derived from its manufacture. Finally, the scientific man and the engineer will specially turn their attention to the progress made, and they will acknowledge their obligations to the Paris Gas Company for having thus displayed before the public the whole of their manufacturing processes and plant, and by so doing enabled all kindred industries to profit by their great experience.

It may here be stated that among the Paris Gas Company's exhibits may be found a sectional view of MM. Pelouze and Audouin's apparatus for the mechanical condensation of the tar produced in the manufacture of gas. The condenser itself is exhibited by the inventors in the Machine Gallery (Class 53), as well as by their licensees for France, Germany, and Spain. The apparatus has already been fully described and illustrated in the pages of the Journal, and as its action has been recently explained by Mr. Young at the meeting of the West of Scotland Gas Managers Association (see *ante*, p. 718), it is unnecessary to give further details here. Suffice it to say that the new condenser recommends itself for the reasons that small space is required for its erection, it does not necessitate expenditure for maintenance and labour, and it can be used in gas-works with or without exhausters, as its working increases the pressure in the mains to the extent of a few inches only. Lastly, it has no injurious influence whatever on the illuminating power of the gas. The apparatus is perfectly automatic, and is consequently unaffected by any variation that may take place in the rate of make. The new condenser will, we feel sure, prove a very useful addition to all gas-works, but especially to those in which the production has so rapidly increased that the cooling apparatus has become inadequate, as well as to those situated in hot climates, where the temperature of the air is such that ordinary condensers can scarcely be efficient. In such circumstances, this method of mechanical or dry condensation, without any washing that can be injurious to the illuminating power of the gas, cannot but render the most valuable service.

The Paris Gas Company have already in use, at their various stations, 20 of these condensers, equal together to the daily purification of 35½ million cubic feet of gas, and they have also been fitted up in more than 100 gas-works in France and other countries, finding their way to Japan and even to the Mormon Settlement.

It is gratifying to find that the merits of this apparatus have been appreciated by the Jurors at the International Exhibition, who have awarded a gold medal to its inventors; and here we may add that these gentlemen have kindly favoured us with one of a very limited number of copies of an extremely humorous sketch, intended to be kept as a *souvenir* of the Exhibition, illustrative of the efficacy of their condenser as a purifying medium. A negro is represented as being forced, very much against his will, into the condenser, through the inlet-pipe on the left-hand side of the sketch, and so thoroughly does the apparatus perform its functions as a *purifier*, that, on issuing from the exit-pipe on the other side, the colour of his skin has been completely changed; the new condenser has positively washed the blackamoor white! and, if we may judge by the expression depicted on his countenance, the purifying operation has caused him the greatest gratification.

THE LANCASHIRE COAL AND IRON TRADES.

(from our own correspondent.)

Both the coal and iron trades of this district continue in a very depressed condition, with prices extremely low, and, with some few exceptions, collieries and iron-works are either partially closed or working short time.

In the coal trade the only sign of animation is in the demand for house-fire classes of fuel, which are moving off more freely in consequence of the colder weather; but there is still none of the general push for supplies, which is usual at this time of the year, and it is at only a few of the best coal collieries that any actual pressure is being felt. In all other classes of fuel there is still no improvement, whilst some of the lower qualities, such as burgy and common slack, are, if anything, more difficult to move, and have to be pushed on the market at extremely low figures. For the better classes of round coal, prices are tolerably steady, but no advance is obtainable, as the means of production are sufficiently large to meet any probable demand which the winter requirements for house coal may bring forward. Common screened round coal, for either gas-making, iron-making, or steam purposes, continues as low in price as ever, and some of the common qualities of round coal are being sold at as low as 4s. 9d. per ton at the pit, whilst common slack can be bought for less than 2s. 6d. per ton at the pit. The average quotations at the pit's mouth may be given about as under:—Best Wigan Arley, 9s. to 10s.; second qualities, about 8s.; common ditto, 7s; Pemberton four-feet, 6s. 6d. to 7s.; common screened round coal, 5s. to 6s.; good burgy, 4s. to 4s. 6d.; and slack, 2s. 6d. to 3s. 6d. per ton.

In the iron trade the demand for pig iron is extremely small, some of the outside brands being rather lower in price, whilst local makers find it almost impossible, except where they have a great advantage in the rate of delivery, to compete with the figures at which Lincolnshire and north country irons are now offered in this district. Finished iron is without material change, local bars delivered into the Manchester district being quoted at £5 17s. 6d. to £6 per ton; but there are very few orders coming to hand.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(from our own correspondent.)

The same difficulty was experienced last week as the week before at the collieries, through a scarcity of tonnage, especially sailing ships of from ten to fifteen keels each. They were not to be had. Handy steamers were likewise difficult to obtain for the coasting trade. Under these circumstances freights were high; 7s. per ton was the figure for sailing ships, and 5s. per ton for steamers for London. The Bordeaux Gas Company, being in want of coals, had to pay £10 a keel to a steamer to load out. This is an advance of fully £2 a keel upon ordinary rates. The gales of wind of the latter part of the previous week had kept the regular steamers back. Boats which should have been in the Tyne on Saturday morning to get away that night, and be up in London some time on Monday, did not reach the Tyne until Tuesday—a voyage was thus really lost, and trade was kept back. There has been considerable activity since, and as the weather is now mild, the trade has got into its regular course again.

The gas collieries are going on as usual. Some contracts were made about a month ago for two years; since then very little has been done in that direction. The price of gas coal is the same—7s. best, 6s. seconds—in fact, there will be no change over the winter. Second-class gas collieries continue to have a moderate time. There is too much of that sort of coal in the market, much beyond the requirements of trade.

The inquiry for house coals has been pretty good. A considerable number of the Durham house collieries are paying off hands. Work is likely to be dull, notwithstanding the prospects of hard, cold weather. The Northumberland steam coal owners and the miners have come to a very satisfactory settlement. Employment at the Northumberland pits is very scarce. In some districts scarcely half time is the rule, and many families are very ill off.

The general manufacturing trade of the Tyne, Wear, and Tees is dull. The chemical trade has been doing nothing over the year, except, in most instances, losing money. If this trade can get through the winter, without incurring further disaster, it will be fortunate. Prices are very low, and shipments are circumscribed. There is a fair inquiry for gas and water pipes, the price being low; but in other respects the Cleveland iron trade shows little improvement. The demand for fire-clay goods is very moderate, as is also that for cement. The Continental shipments of fire-bricks are not large. The heaviest of late have been to the Mauritius. The distant ports of the Baltic are closed for the winter. The principal shipments of goods by steamers are for Reval and Riga. A good few goods for manufacturing purposes are sent to the ports mentioned for transit to Moscow, St. Petersburg, and the interior of Russia.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The transference of the gas supply undertaking from the Peterhead Gas Company to the Municipal Authorities of the town, under the provisions of the Burghs Gas Supply (Scotland) Act, was completed on Friday—the arbiters, Messrs. Smith, of Aberdeen, and M'Crae, of Dundee, mutually agreeing that the amount to be paid by the Town Council should be £12,000. It is confidently anticipated that the town will soon be supplied with gas on cheaper terms than hitherto.

Notwithstanding the fact that Whitsunday is the general flitting term in Scotland, no fewer than 1200 persons gave intimation at the Dundee Corporation Gas Office of their intention to remove at the Old Martinmas term, which occurred on Friday last. Such an amount of meter-examining at one time, as is indicated by that fact, must necessarily put a considerable strain on even such a well-equipped gas management as that of Dundee.

The Dundee Gas Commissioners are determined, apparently, that nobody shall anticipate them in having the public lighting of the town satisfactorily tried by the use of the electric light. At their first meeting as a reconstituted Commission, held last Thursday, they resolved to have experiments made in one of the principal streets, and the matter was remitted to the Works Committee. On the same occasion they resolved to borrow the sum of £10,000 under their Gas Act of last session.

At last week's meeting of the Edinburgh Town Council, on the motion of Bailie Rowatt, who expressed the conviction that the electric light would be the light of the future, it was remitted to the Cleaning and Lighting Committee to appoint a Committee of their number to acquire what information they possibly could as to the adaptation of that light for illuminating the city of Edinburgh, and report to the Council. The motion, as it appeared on the *agenda* paper, contained a clause giving power to the Committee to send one or more of their number to see the effects of the light where experiments were made with it; but these words were omitted.

The Gas Committee of the Arbroath Town Council met last Thursday, when the question of Sunday labour was discussed at considerable length. An opinion was expressed by some of the members that, as a public boby, they were, to a certain extent, custodians of the public morals, and that, in that capacity, it was their duty, as far as lay in their power, to lighten Sunday labour. The notion that work could be discontinued entirely on that day was out of the question. After various suggestions had been made, the Committee ultimately agreed to recommend a system of relief men to take the place of the regular hands, in order to give them every third Sunday clear.

At present an unusual number of gas shares are being publicly advertised for sale, owing, apparently, to the need to realize which is caused by the depression in trade now very generally existing. There was also a good deal of commotion in the price of gas shares, as recorded from day to day in the Stock Exchange lists, the tendency generally being downwards. On Saturday week there was a rise in the Edinburgh and Leith Company's shares to the extent of 5s., business being done at 28½, declining again, however, on Tuesday and Wednesday, to 28. Glasgow 9 per cent. gas annuities were depressed on Saturday week, from £208 10s. to £200, at which business was done; but on Wednesday they recovered £1, business being done at £201. Aberdeen gas annuities improved to the extent of 2s. 6d. last Thursday, some of them changing hands on that day at £5 17s. 6d.

The delivery of water into Edinburgh during the fortnight ending the 19th of November was at the rate of 5999·49 gallons per minute, which is equal to a supply of 29·53 gallons per head to a population of 292,500. At the corresponding date of last year the delivery was at the rate of 6230 gallons per minute. The quantity of water in store on the 19th inst., in the five reservoirs of the Water Trust, was 443,810,000 gallons, as against 416,955,457 gallons on the 5th inst., and 660,507,531 gallons on the same date of last year. The rainfall at Glencorse from the 1st of January till the 19th of November of the last three years was as follows:—1876, 38·31 inches; 1877, 50·00 inches; 1878, 32·25 inches.

At a meeting of the Carluke Local Authority, held last Thursday, it was resolved to ask from the Public Works Loan Commissioners a loan of £7500 for the proposed new water-works, and other £900 for the construction of drainage works.

During the months of July, August, and September, the average amount of water sent daily into Glasgow and the surrounding districts was 33,893,000 gallons from the Loch Katrine works, and 3,531,000 gallons from the Gorbals works, or a total of 37,424,000 gallons, as compared with 34,379,000 gallons, which was the average for the corresponding three months of last year, or an increase of 3,045,000 gallons. The total quantity of water in store on the 19th of October was—In lochs, 99 days supply, as against 114 on the corresponding date last year; in Mugdock reservoir, 12 days supply, as against 17 on corresponding date; and in Gorbals reservoirs, 105 days supply, as compared with 132 on corresponding date.

A meeting of the Galashiels Manufacturers Corporation was recently held to consider a circular issued on behalf of the riparian proprietors on the Tweed, with reference to river pollution. There was expressed a general disposition to prevent, as far as possible, the pollution complained of, and as it appeared that some of the members had already in operation measures for purifying their discharges, a Committee were appointed to collect information, and to report to an adjourned meeting. At the adjourned meeting, held last Thursday, the report of the Committee, recommending that each millowner, with as little delay as may be, should construct works of purification, was unanimously adopted.

Last week's Glasgow pig iron market was very much depressed, and a large business was done at low prices. On Monday the price ranged from 43s. 3d. to 43s. 2d. cash, and the market closed on Friday, with sellers, at 42s. 9½d. cash and 42s. 11d. one month, the decline being 6d. per ton over the prices paid on the previous Friday. The demand for manufactured iron continues to be very dull, and short time is the rule at most of the works.

Very little change, if any, has occurred in the condition of the coal market. Prices, however, are steady.

SALES OF GAS AND WATER SHARES.—We have received the following information respecting recent sales of gas and water shares:—Twenty £25 shares, £12 10s. paid, in the Derby Water-Works Company, sold at the rate of £23 5s. per share. Two £25 fully paid new shares in the Derby Gas Company sold for £29 each. Cambridge University and Town Water-Works Company's consolidated stock realized an average price of £240. Shares in the Brotton Gas Company, Limited, near Saltburn-by-the-Sea, on which £93 has been paid, were sold for £175. Thirty-six fully paid-up original £10 shares in the Folkestone Gas and Coke Company, entitled to a dividend of £10 per cent., sold for £16 on an average, some being sold for £16 and others for £15 10s.; while seven shares of the new stock, entitled to 7½ per cent., fetched £13 10s., and two others £13.

EXHIBITION OF GAS HEATING AND COOKING APPARATUS AT HUDDERSFIELD.—Last week an exhibition of gas-heating and cooking apparatus was held at Huddersfield, promoted by the ironmongers and gas-fitters of the town, in conjunction with the Gas Committee of the Corporation. There was a private view of the exhibits on Monday, and during the rest of the week the public were admitted free by ticket. The apparatus was arranged in the old Corporation Offices, in Ramsden Street, and was sufficient to occupy all the space at the disposal of the Gas Committee. Nearly all the leading manufacturers of cooking and heating stoves were represented, and the exhibition was eminently successful. In the room which was formerly the Mayor's parlour, Mr. John Burgess, the Engineer and Manager of the Corporation Gas-Works, exhibited a collection of gas-burners and meters, which deservedly attracted much attention.

APPROPRIATION OF GAS PROFITS AT WALSALL.—At the meeting of the Walsall Town Council on Saturday, the 16th inst., it was reported that the general working of the old and new gas-works for the year ending Sept. 29, 1878, being the first year after the completion of the new works, had resulted in a clear net profit of £4139 6s. 5d., after paying all revenue charges and cost of maintenance, and also the interest on all mortgage debts, and likewise the amount of £1300 to the Birmingham Corporation in respect of the purchase from them. It was resolved, pursuant to the recommendation of the General Purposes Committee—"That the sum of £3139 6s. 5d., part of such net profit, be transferred to the borough-fund, in aid of the borough rate, being an amount equal to, and therefore in reduction of such borough rate to the extent of 7d. in the pound;" and "That the residue of such net profit, being £1000, be retained and form part of the reserve-fund."

THE SEWAGE OF CANTERBURY.—The Canterbury Corporation have a serious difficulty before them in reference to the disposal of the sewage of the town. A few years ago a new system of drainage was carried out, and filtration works erected about two miles from the city, at an aggregate cost of between £40,000 and £50,000. The effluent water is carried along an open channel from the filter-beds for some distance, and finally empties itself into the River Stour, which is controlled by a body of Sewers Commissioners. These have taken proceedings under the Rivers Pollution Prevention Act; and, on appeal, the Local Government Board have decided that the best possible means have not been taken by the Corporation to render the outfall unobjectionable, and they refuse to grant a certificate which would prevent the Sewers Commissioners from obtaining an injunction. No scheme, however, has been suggested, and the pressing question is, What is to be done to remedy the evil complained of?

THE PURCHASE OF THE NEWRY GAS-WORKS.—In the last session of Parliament, the Newry Town Commissioners obtained an Act empowering them to purchase the Newry Gas Consumers Company's works, and since then considerable excitement has prevailed amongst the ratepayers as to whether the purchase should be completed by the 1st of January next, in the face of the scare as to the electric light. At the meeting of the Commissioners on Monday, the 18th inst., a deputation waited upon them in reference to the question. Mr. Fennell, as spokesman, said the Commissioners were bound in honour, though not legally, to carry out the purchase; but many of the inhabitants thought that it would be highly inadvisable to incur the heavy debt which would be entailed by the purchase of the works, when the probability of the electric light being utilized was taken into account. Mr. O'Hagan, J.P., said, before the Commissioners decided to take any action in the matter, the opinion of a majority of the ratepayers would have to be made known to them. It was also pointed out that if the purchase of the works were not completed before the 1st of January next, the Act of Parliament would lapse, and the works would be retained by the Company. Some discussion ensued, and the deputation withdrew. It is expected that a town's meeting will be held in a few days to consider the subject.

OPENING OF A NEW RETORT-HOUSE AT THE MAIDSTONE GAS-WORKS.—On Thursday, the 7th inst., the new retort-house which has recently been erected by the Maidstone Gas Company at their works in St. Peter Street was formally opened, the occasion being taken advantage of by the Directors to give an exhibition of West's System of Charging and Discharging Retorts, which has been adopted in the new building, and to entertain a number of gentlemen and the *employés* at dinner. The new retort-house and coal stores have been specially designed by the Company's Engineer, Mr. John West, for using his patented machinery, which has been for some time working in the old retort-house with great success and advantage to the Company. The retort-house is 150 feet long by 68 feet wide, with coal stores on each side. It contains 15 benches of through D-retorts, 21 inches by 15½ inches by 20 feet long, or 180 mouthpieces, fitted with Morton's patent self-sealing lids and all the latest improvements. The machinery for drawing and charging the retorts is, of course, the special feature, but, in addition, other important extensions have been made. A steam hoist has been erected for unloading coals, which are delivered in the coal store by waggons upon a line of rails extending the entire length of the coal stores. The exhauster and engine house is fitted with Beale's exhausters, and Galloway's boilers. One of Livesey's patent washers is ready for work, and fronting the river are placed the 24-feet square purifiers, which have been especially designed by Mr. West to meet the difficulties found in the extraction of sulphur and other impurities at Maidstone. The arrangement has received the approval of Dr. Odling and Messrs. Keates, Heisch and Hartley.

EXTENSIONS AT THE EXETER GAS-WORKS.—On Thursday, the 14th inst., the Mayor and Town Council of Exeter, at the invitation of the Contractors (Messrs. Willey and Co.), paid a visit to the large new holder just completed for the Exeter Gaslight Company. It is a telescopic holder, with an annular cast-iron tank. The diameter of the outer holder is 117 feet 3 inches, and the total depth 51 feet. It has 14 ornamental iron columns, 60 feet high, with 28 ornamental trellis girders, and 24-inch inlet and outlet pipes. It is the largest holder in the West of England, and will contain over half a million cubic feet of gas. The total weight of ironwork used in its construction exceeds 800 tons. Of this amount the bolts and nuts used alone weighed 25 tons, whilst the 14 pillars weighed 11½ tons each. It is estimated to hold two-thirds of the gas necessary for the supply of the city on a mid-winter's night. The holder was commenced in May last, and has been completed a month within the time specified in the contract. Its value, including masonry, is about £12,000. Although itself ready for use, it is estimated that the necessary work in connection with it must entail another fortnight's labour. After an inspection of the work, the party were invited by Mr. Willey to a luncheon, at which the Mayor presided, and in responding to the toast of his health expressed the pleasure he had experienced in witnessing the work that had been so satisfactorily carried out, and his gratification at finding that a citizen of Exeter possessed both the talent and the means to deal with an undertaking of such magnitude. He then proposed the health, of Mr. Willey, who received hearty congratulations on the success of the work, and who, in reply, gave an interesting and practical account of the construction of the apparatus, illustrated by drawings. The health of Mr. S. E. Stevenson, the Engineer of the Company, was proposed by the Chairman of the Company (Mr. W. Cuthbertson) and warmly received, so was also that of "The Secretary of the Company and the Executive Staff," responded to by Mr. W. A. Padfield.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

4525.—Chandler, S., Newington Causeway, London, "Improvements in the construction of apparatus used in the manufacture of gas." Nov. 8, 1878.

4539.—Preston, F. P., Prestige, J. T., Preston, E. J., Fowler, J. A., and Simmons, W. G., Deptford, London, "Improvements in apparatus for measuring, regulating, controlling, and arresting the flow of fluids." Nov. 8, 1878.

4553.—Gray, M., Cannon Street, London, "An improved mode of manufacturing carbons for electrical purposes." Nov. 9, 1878.

4559.—Davis, C., Pall Mall, London, "Improvements in the arrangement of mechanism to be employed in connection with apparatus for producing light and heat by means of electricity." Nov. 11, 1878.

4568.—M'Kenzie, J., Ealing, Middlesex, "Improvements in electric light apparatus." Nov. 11, 1878.

4573.—Zanni, G., Highbury, London, "Improvements in apparatus chiefly designed for the electro deposition of metals and the production of light by electricity." Nov. 11, 1878.

4575.—Tyler, H. W., Colchester, Essex, "Improvements in the means or apparatus for electric lighting." Nov. 12, 1878.

4585.—Haddan, H. J., Westminster, "Improvements in purifying and increasing the light power of illuminating gas." A communication. (Complete specification.) Nov. 12, 1878.

4595.—Heinrichs, C. F., Queen Square, London, "Improved means and apparatus for generating electric currents, and an improved electric lamp." Nov. 13, 1878.

4611.—Edwards, E., Southampton Buildings, and Normandy, A., Victoria Docks, London, "Improvements in methods of and apparatus for producing light, heat, or motive power by means of electricity." Nov. 13, 1878.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

1927.—Jensen, P., Chancery Lane, London, "Improvements in the construction and application of electric apparatus." A communication. May 14, 1878.

1963.—King, C. W., Chester, and Cliff, A., Liverpool, "Improvements in and appertaining to valves and to the method of actuating and governing them, such improvements being applicable to the valves of motors and pumps known as the three-cylinder type, and also applicable in part to other types and classes of engines and pumps." May 16, 1878.

1997.—The Hannover'sche Maschinenbau Actiengesellschaft vormals Georg Egestorff, Linden, Prussia, "Improvements in gas-engines with two pistons." A communication. May 17, 1878.

2106.—Martin, R., Horsham, Sussex, "Improvements in the manufacture of gas, and apparatus suitable thereto." May 27, 1878.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

3526.—Clark, A. M., "Improved automatic gas lighting and extinguishing apparatus." Oct. 11, 1875.

3625.—Clark, A. M., "Improvements in water-meters." Oct. 19, 1875.

3668.—Slater, J. W., "Improvements in the treatment of sewage deposits or precipitates or sewer sludge in order to obtain therefrom ammonia, illuminating gas, and other useful products." Oct. 21, 1875.

3749.—Timme, H. F. O., "Improvements in mechanism, or apparatus for raising and lowering chandeliers and other similarly suspended objects or bodies." Oct. 28, 1875.

3827.—Mathews, T., "Improvements in meters or apparatus for measuring and indicating the flow of fluids." Nov. 3, 1875.

3850.—Bennett, J. T. B., "An improved retort and arrangement of retorts for manufacturing gas and other purposes." Nov. 5, 1875.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

2844.—Sugg, W. T., "Improvements in apparatus for distributing fluids and liquids." Oct. 24, 1871.

2948.—Tylor, A., "Improvements in lavatories, the basins, cocks, taps, valves, and apparatus and arrangements connected therewith, parts of which improvements are applicable for other purposes for controlling and regulating the discharge of liquids and fluids, and preventing waste." Nov. 3, 1871.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, TWO MEDALS at the PHILADELPHIA EXHIBITION, and TWO MEDALS at the PARIS EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

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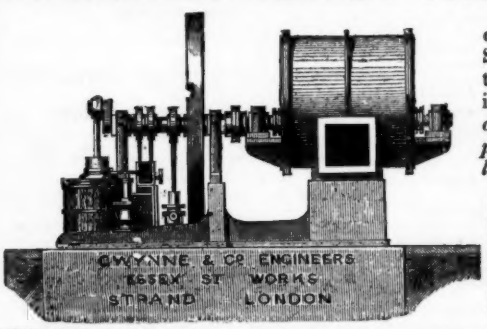

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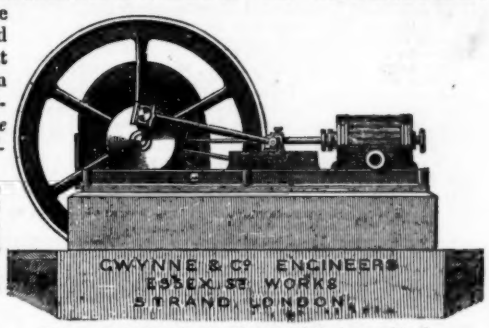
The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 8,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



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Exhausters, with or without Engines combined, can be made to pass the gas WITHOUT OSCILLATION OR VARIATION IN PRESSURE Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

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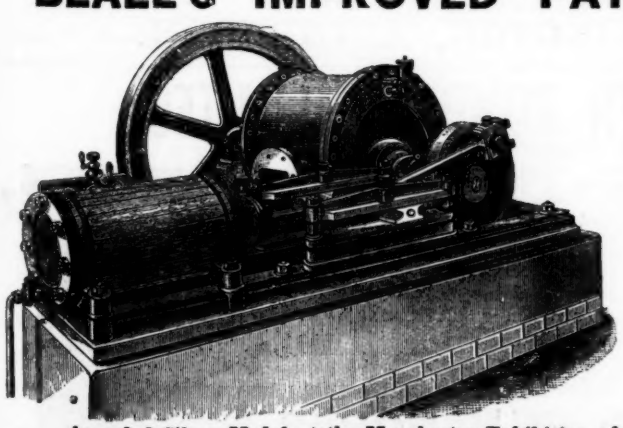

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WANTED, Readers of the Pamphlet, "Cooking and Heating by Gas;" on Burners, &c. Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Gas-Works, SYDENHAM, S.E.

WANTED, by a Gas Engineering firm, an AGENT for Lancashire and Yorkshire.
Apply, by letter only, to No. 510, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, partial Employment in London or Suburbs; either in Office or as METER INSPECTOR or COLLECTOR.
Apply S. B., care of Mr. Lass, 30, Gracechurch Street, LONDON, E.C.

WANTED, after Christmas, a Situation as CLERK or ASSISTANT MANAGER. Five and a half years in Iron-Works, and two in entire charge of Gas-Works.
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WANTED, by the Advertiser, a Situation as Carbonizing or General FOREMAN in a Gas-Works. Thoroughly understands the plans of all improved Retort-Settings, and the Practical Working of a Retort-House. Could superintend the Erection of Retort-Beds and all connections from the same. 20 years experience. No objection to go abroad. Good testimonials.
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TO GAS MANAGERS AND OTHERS.

WANTED, at once, a Steady and Competent MAN, to proceed to Maryborough, Queensland, to erect a Gas-Works of 100,000 cubic feet per day capacity. Preference will be given to one accustomed to the management of Gas-Works. Passage free, and wages to commence on arrival at £4 per week.
Address, stating age and experience, with copies of testimonials, to Messrs. J. and J. BRADDOCK, Gas Engineers, Globe Meter-Works, OLDHAM.

MAIN AND SERVICE LAYER.

WANTED, by the Leamington Priors Gas Company, a MAIN and SERVICE LAYER. One capable of fixing Meters would be preferred. None but competent and steady men need apply.
Applications, with testimonials, stating wages required, to be sent in, addressed to the undersigned, not later than the 30th inst.
WM. CROSS, Secretary and Manager.

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.
John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

TO GAS PROPRIETORS AND ENGINEERS.

RE-ENGAGEMENT is sought by a practical, energetic Manager—formerly for 16 years with the late Edwin Unwin, Esq., Sheffield Gas Company—or to assist in large Works in any department.
Thorough knowledge of Carbonizing, Fitting, Meters, Mains, Photometer, and of Colonial Gas-Works.
Very satisfactory references and reasons for change will be sent on application to No. 506, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE.—One 10 ft. square by 5 ft. deep Cast-Iron PURIFIER, with 10-in. Inlet and Outlet Connections. Also One 10-in. CENTRE-VALVE, equal to new.
Apply at the Gas-Works, Bromley, KENT.

FOREMAN WANTED.

REQUIRED for the Bombay Gas Company Works at Bombay, a general YARD FOREMAN having a thorough practical knowledge of Carbonizing and Setting of Clay Retorts, as well as the general work about a Gas-Works. Wages 200 rupees per month, free house on the works, with fire and gas and passage out and home. One who has been accustomed to Foreman's duties preferred. Engagement for five years, subject to certain conditions as to qualifications.
Applications, by letter only, addressed to the SECRETARY of the Bombay Gas Company, Limited, 4, Great Winchester Street, LONDON, with testimonials (copies only, and which will not be returned), to be made on or before the 1st of January next.

TO GAS AND WATER ENGINEERS.

A Well-known Engineer and Contractor desires to place his Son (19 years of age and educated at a public school) with a gentleman who has Gas and Water Works under his charge, and who besides has plenty of outside practice. The advertiser's object is to obtain for his son sound theoretical and practical training in the construction and management of Gas and Water Works.
The engagement to be for three years, and terms to state both for indoors and outdoors at per year.
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TO GAS MANAGERS.

FIRE-CLAY Retorts, ovals, 14 by 22 (inside), perfect, for SALE cheap.
SAMUEL HAYWARD, New Park Street, LONDON, S.E.

CAST-IRON Borings, best quality, any quantity, delivered to any railway station in England.
SAMUEL HAYWARD, New Park Street, LONDON, S.E.

THE Wootton Gas Company have for disposal a quantity of GAS PLANT suitable for a small Gas-Works. Consisting of Hydraulic Main, Mouthpieces, Ascension-Pipes, 6-in. Condensers, Scrubber, set of four Purifiers, 5 ft. square and 3 ft. deep, with Grids and Centre-Valve, complete. All the above is in good order, having recently been replaced by larger plant.
All information may be obtained from the undersigned, at the Gas-Works, Wootton, near Liverpool.
HENRY HATCH, Manager.

STATION-METER FOR SALE.

THE Gas Committee of the Rochdale Corporation offer for SALE a STATION-METER, capacity 25,000 cubic feet per hour, 12-in. Connections, Hydraulic Valves, and Bye-Pass, and all other necessary fittings. The Meter to be removed in consequence of extensions.
Any further information thereon can be had from the Manager at the Works.
Tenders, endorsed "Tender for Station-Meter," must be sent to me.
By order,
ZACH. MELLOR, Town Clerk.
Town Hall, Rochdale, Aug. 2, 1878.

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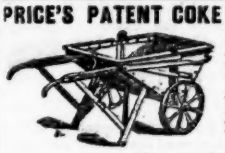

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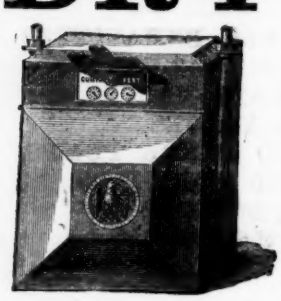

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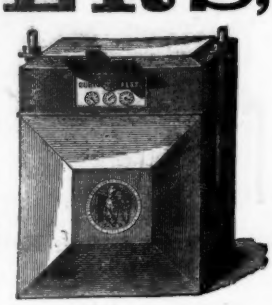

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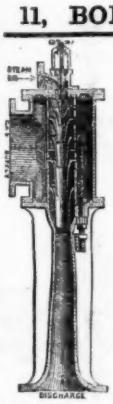

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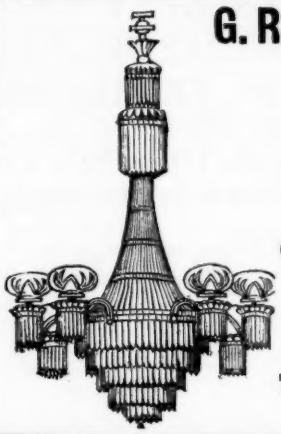

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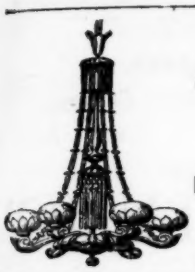

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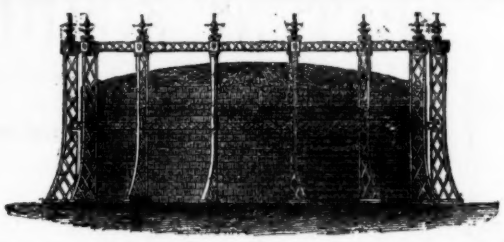

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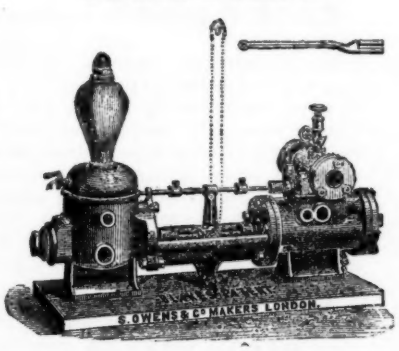

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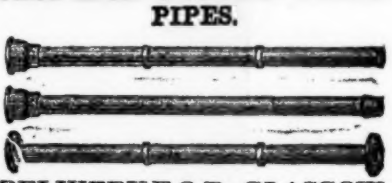

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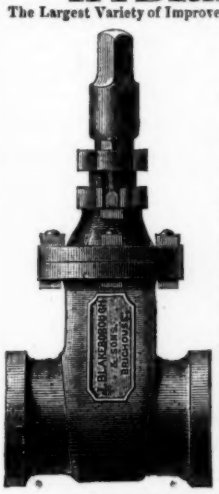

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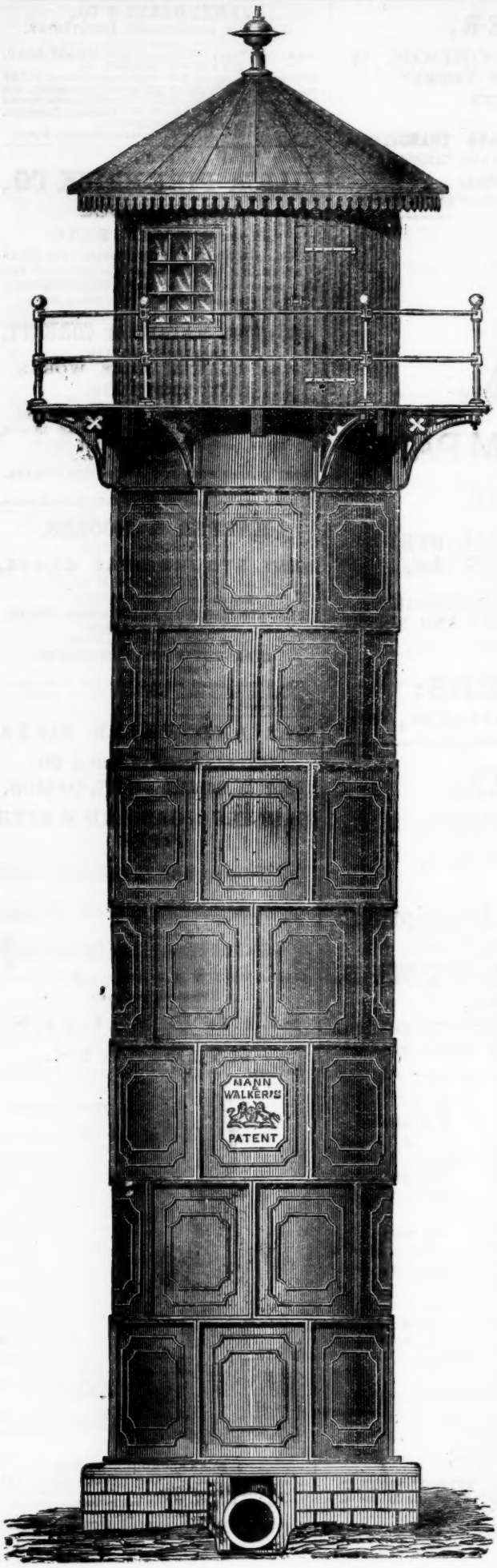

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By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours or a winter's day, and the smallest make on a summer's day, to be purified.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

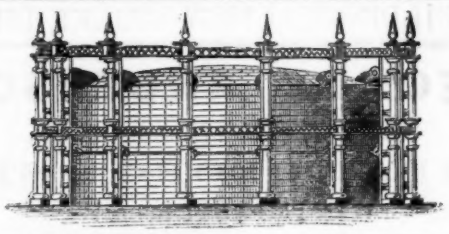
NEWGATE STREET, LONDON.

Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

HOPE IRON WORKS,



STOCKTON ON TEES.

ASHMORE & WHILE,

GAS ENGINEERS & CONTRACTORS,

MANUFACTURERS OF GASHOLDERS,

GAS APPARATUS OF EVERY DESCRIPTION,

Including Improved

Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,

And GENERAL IRONWORK.

N.B.—Estimates for all Gas Plant and Remodelling supplied on application.

THOMAS CARR & SON,

MANUFACTURERS OF

FIRE-BRICKS, LUMPS, TILES, RETORTS, &c.,

COTSWOOD FIRE-BRICK WORKS, SCOTSWOOD-ON-TYNE.

Also Makers of all kinds of Common Building Bricks, and of Pressed White and Red Bricks for Facing.

CADZOW COAL COMPANY,

LIMITED.

Cadzow Collieries, Hamilton (Lanarkshire).

Office: 161, Hope Street, Glasgow.

Report on the Cadzow Ell Coal.

By Dr. W. WALLACE, F.R.S.E., F.C.S., Gas Examiner for the City of Glasgow.

I have made a careful chemical analysis and practical assay of an average sample of the Ell Coal from Cadzow Colliery, received on the 5th inst., from Messrs. The Cadzow Coal Company, Hamilton, and have obtained the following results:—

Analysis.

Volatile matters	Gas, tar, &c.	34·03	46·12
	Sulphur	·04	
	Water, at 212° Fahr.	12·05	
Coke	Fixed carbon	52·90	53·88
	Sulphur	·03	
	Ash	·95	
			100·00

Coke (dry) per ton of Coal, 1205 lbs., or 10 cwts. 3 qrs. 1 lb

Analysis of the Coke (Dry).

Carbonaceous or combustible matter	98·18
Sulphur	·06
Ash	1·76
	100·00
Specific gravity of the coal	1·250
Weight of a cubic foot in pounds	77¾

Practical Results.

Gas per ton of coal at 60° F. and 30 in. bar.	10,122 cub. ft.
Illuminating power in standard sperm candles by Argand jet, consuming 5 cubic feet per hour	16·76 candles.
Value of one cubic foot of gas in grains of sperm	402
Equivalent of a ton of coal in pounds of sperm candles	581
Durability of one cubic foot of gas by 5-inch flame	42 min. 45 sec.
Gravity of the gas, air = 1000	448

Remarks.

The sample tested consisted of a complete section of the seam, 5 ft. 6 in. in thickness. The results show that this Coal is well adapted for the manufacture of gas and coke, both being for soft coal of very fine quality. Of the many hundreds of coal samples I have tested, I have not hitherto had one with so small a proportion of ash as the Cadzow Coal. WILLIAM WALLACE.

Chemical and Gas Laboratory,
138, Bath Street, Glasgow, March 15, 1878.

WELLS, BIRCH, RYDE, and CO., Limited,

HOYLAND SILKSTONE COLLIERIES,

Near BARNSLEY.

This Company is now in a position to raise **2000 tons per day of REAL OLD SILKSTONE GAS COAL.**

"The quality of this Coal for Gas purposes, if equalled, is not excelled by any on record, and the Coke competes successfully with best Durham."—See *Mining Journal*, Aug. 11, 1877.

Prices quoted to any Railway Station, or F.O.B. Hull, Grimsby, Goole, Keadby, Liverpool, and Fleetwood.

Full particulars will be sent on application to above address.

IMPROVED
COMPENSATING GAS-METER.
HUNT'S PATENT.

This Meter supplies a want long felt, by putting an end to the loss sustained by Gas Companies through the overworking of their Meters.

These Meters can now be supplied in either TIN-PLATE or CAST-IRON CASES, and OLD METERS converted to this plan. GAS COMPANIES and CORPORATIONS will find it to THEIR ADVANTAGE to adopt these Meters.

EXTRACTS FROM REPORTS.

"I am able to report that the Meters have given in each test most satisfactory results."—*Mr. H. Sporne, City of London Meter Inspector.*

"I consider the arrangement is a great improvement upon the Meters in present general use."—*Mr. T. Jackson, Meter Inspector, Birmingham.*

"I would observe from the results of my testings that the Meters are a great improvement on the ordinary Wet Meters in general use."—*Mr. H. Airey, Meter Inspector to the Metropolitan Board of Works.*

COPIES OF REPORTS SENT ON APPLICATION.

MANUFACTURED BY

JOHN BENT & SON,

WET AND DRY GAS-METER AND GAS APPARATUS MANUFACTURERS,

BELL BARN ROAD, BIRMINGHAM.

Established 1830.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

198, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full Analyses on application.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,

CANNEL COAL MERCHANT,

HAYMARKET, EDINBURGH.

Established 1840.

DEAN'S PRIMROSE GAS COALS.

South Metropolitan Gaslight and Coke Company, London, July 12, 1878.

The Owners of the Dean's Primrose Colliery.

Dear Sirs,—I have much pleasure in stating that this Company have regularly used your Coals for more than thirty years, and that in all essential particulars they give the most satisfactory results.

The yield of Gas is from 9700 to 9800 feet per ton, of full 16 candles illuminating power, tested by the London Referees Standard Burner; and the Coke is of very good quality, while the quantity is about 40 bushels to the ton of Coal.

I consider Dean's Primrose Coals to rank amongst the first-class Gas Coals from the Durham Coal-Field.

Yours truly, GEORGE LIVESEY.

These Coals are also used by The Gaslight and Coke Company (London), and other English and Foreign Gas Companies.

Steamers loaded with quick despatch in the River Tyne. Price and other terms on application at the

FITTING OFFICE, NEWCASTLE-ON-TYNE.

HOLMSIDE GAS COALS.

South Metropolitan Gaslight and Coke Company, 589, Old Kent Road, London, S.E., Oct. 9, 1873.

At the request of Mr. Hedley, the owner of the Holmside Colliery, I have much pleasure in stating that, for about ten or twelve years past, this Company has taken at least half of its supply of Newcastle Coal from him. I can, therefore, confidently bear testimony to the good quality of the Holmside Coals, and consider they are equal to the best of the Newcastle Coals, in proof of which I may state that this year we are using those Coals exclusively, that the yield of Gas is from 9700 to 9800 feet per ton, and that the quality of the Gas, without any admixture of Cannel, is over 16 candles, as tested by the officer appointed by the Metropolitan Board of Works, using the London Gas Referees test.

The Coke is of excellent quality, and in quantity amounts to about 40 bushels from a ton of Coal.

The annual consumption of Coal amounts to about 75,000 tons.

GEORGE LIVESEY, Engineer and Secretary.

P.S.—I am at this date, Feb. 15, 1875, still using Holmside Coals as largely as ever, and am quite as well pleased with them as when I gave the above certificate.

GEORGE LIVESEY.

We are this year, 1878, using 80,000 tons of Holmside Coal. GEORGE LIVESEY.

FITTING OFFICE:
Address, 75, QUAYSIDE, NEWCASTLE-ON-TYNE.

M. BREMOND'S NAPHTHALINE PROCESS.

A negotiations respecting M. Brémond's patented process for preventing Deposits of

NAPHTHALINE

in Gas Main and Service Pipes should be addressed to Mr. W. H. BENNETT, 22, Great George Street, WESTMINSTER, S.W., or to M. BREMOND, Gas Engineer, Compania Madrilena de Alumbrado y Calefaccion por Gas, MADRID, who may be consulted upon all matters connected with the Gas Industry.

FERRAND DAVIES,

148 GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,

AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL,

AND

NEWTON, CHAMBERS, & CO.'S SILKSTONE GAS COALS.

Analyses and Quotations on application.

WILSON CARTER AND PEARSON,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station or for Export all kinds of Fuel for Gas purposes.

Address—CHIEF OFFICES:

TEMPLE BUILDINGS, 50, NEW STREET, BIRMINGHAM.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

35A, GREAT GEORGE STREET,

WESTMINSTER, S.W.,

PATENTEE and MANUFACTURER of the following Invention

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Eighteen Illustrations and Letterpress on the Construction of Gas-Works, post free, 2s. 6d.

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

35a, GREAT GEORGE STREET, WESTMINSTER, S.W.

J. & J. BRADDOCK,

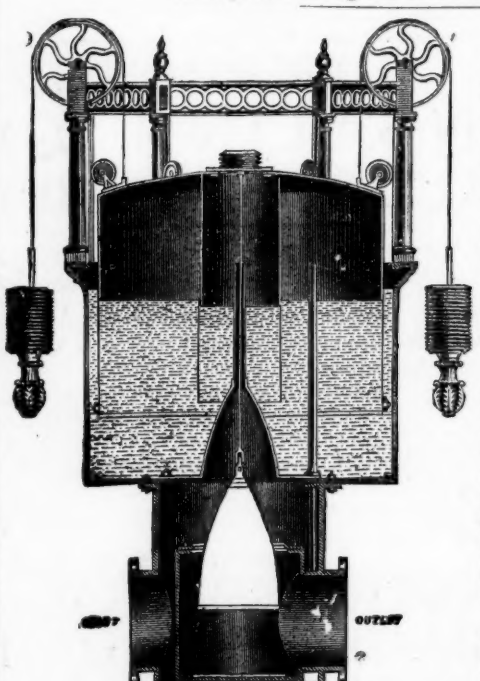
GLOBE METER-WORKS,

OLDHAM,

Beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

DODWORTH, BARNSLEY.

BENJAMIN WHITWORTH, Esq., M.P. . . . . Chairman.
Mr. RICHARD HARTLEY . . . . . Managing Director.

REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12.240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

PARIS EXHIBITION, 1878.

THREE MEDALS
AND
HONOURABLE MENTION
HAVE BEEN AWARDED TO
JOSEPH CLIFF & SONS
For their Various Exhibits, amongst which is a
SILVER MEDAL
FOR THEIR
PATENT MACHINE-MADE
RETORTS AND FIRE-BRICKS,
Being the Highest Honour given for this class.

Established

1795.

JOSEPH CLIFF & SONS,

THE ORIGINAL
WORTLEY FIRE-BRICK WORKS,
NEAR LEEDS,
London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N. Liverpool: Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-Made Retorts have now been thoroughly tested, and have proved themselves infinitely superior to those made by hand. At several large works it has been settled, beyond question, that, owing to their compactness and general excellence, more gas is sent to the gasholder from each ton of coal carbonized than is the case with hand-made Retorts.

THE
SILBER LIGHT COMPANY, LIMITED,
49, WHITECROSS STREET, LONDON, E.C.,
Manufacturers of SILBER BURNERS FOR COAL OR AIR GAS, & FITTINGS.

No. 285.
The Silber Tubulated Gas-Burner.

The *World* says: "The light given by these Burners, besides being abundant in quantity, is almost like sunlight in its quality, so that it produces the same spectrum when refracted through a prism, and allows even the most delicate shades of colour to be distinguished."

Dr. W. WALLACE, F.R.S.E., F.C.S., says: "It gives the steadiest flame of any Argand yet constructed."—*Vide* Report presented to the Dublin Meeting of the British Association, Aug. 15, 1878, "On the Best Means for the Development of Light from Coal Gas of Different Qualities."

No. 291.
The Silber Tubulated Gas-Burner, with Opal Shade and Cup and Governor attached.

The *London Medical Record* says: "This uniform blending of the air with each part of the flame results in rendering it pure and white, and very considerably lessens the blue colour, which is significant of waste, and which is very plainly visible at the base of all imperfect lights. The creation and the maintenance of this white light—not yellow light—is a proof of perfect combustion.

No. 286.
The Silber Bat's-wing Gas-Burner

The *Sanitary Record* says: "Mr. Silber's improvements render it possible to eliminate, as far as is practicable, the sulphuric acid due to the incomplete combustion of impure gas."

The *British Medical Journal* says: "In the whole of Mr. Silber's inventions there is noticeable a complete attention to, and adoption of, natural laws."

THE SILBER LIGHT COMPANY, LIMITED,
Are also Manufacturers of every description of Lamps for Railways, Ships, Streets, Churches, and Domestic Purposes.

NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,
NEAR SHEFFIELD.

CELEBRATED SILKSTONE GAS COALS.

The various descriptions of Gas Coal produced from the above Collieries possess an unequalled reputation, combining in a large degree the constituents essential for the production of the best quality of Coke and Gas of a high illuminating power.

A recent extensive development of the Collieries enables us to offer increased supplies.

JAS. PATERSON, Esq., of Warrington, after testing various qualities of our Coal, has sent the following testimony of their merits:—

"Warrington Gaslight and Coke Company,
Offices, Mersey Street, Warrington, April 23, 1877.

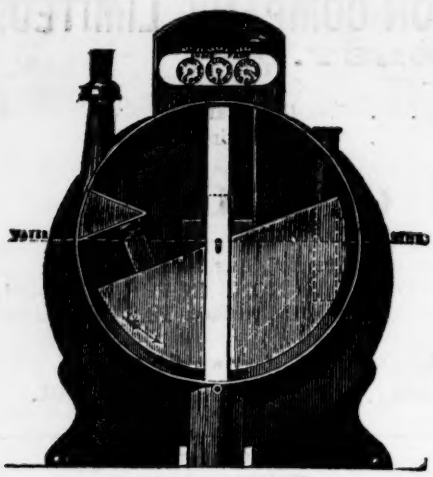
"MESSRS. NEWTON, CHAMBERS, AND CO.,

"GENTLEMEN,—After carefully testing the various samples of Gas Coals sent from your Collieries for analysis, I have pleasure in reporting them as belonging to the highest class of Gas and Coking Coals.

"The average of Nine samples gives a yield of **12,500** cubic feet of **15½**-Candle Gas, being equivalent to **664** lbs. of sperm per ton, and **1420** lbs. of fixed carbon of a very superior quality. All the samples bear a close relation to each other in value.

"Yours truly, "JAMES PATERSON."

Full particulars will be sent on application to us—address as above.



THE
UNVARYING WATER-LINE GAS-METER.
(SANDERS AND DONOVAN'S PATENT.)

"Unquestionably the best Water Gas-Meter now in use."—Thos. G. Barlow, C.E.

Over 120,000 in action.

MANUFACTURERS:

THE GAS-METER COMPANY, LIMITED,
KINGSLAND ROAD, LONDON;
WITH
Branch Manufactories at DUBLIN and OLDHAM.

ALEXANDER WRIGHT & CO.,
MANUFACTURERS OF
"WET" AND "DRY" GAS-METERS,
STATION-METERS, AND GOVERNORS.
METERS, BOXES, REGULATORS, AND ALL REQUISITES FOR PUBLIC LIGHTING.
TESTING APPARATUS for all purposes relating to Gas, &c.
MR. VERNON HARCOURT'S COLOUR TESTS,
Descriptive particulars, per post, 2d.

55, 55a, & 56, MILLBANK STREET, WESTMINSTER,
LONDON, S.W.

R. LAIDLAW AND SON,
EDINBURGH AND GLASGOW.
Manufacturers of
CONSUMERS IMPROVED WET GAS-METERS,
THE UNVARYING WATER-LINE GAS-METERS,
IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;
STATION-METERS, ALL SIZES, up to 15 feet Square, with PLANED JOINTS;
Experimental Meters, Photometers, Pressure-Gauges,
Governors, Test Holders, &c., &c.
LONDON OFFICE: 106, CANNON STREET, E.C.

IMPROVED HYDRAULIC CRANES,
Effecting a great saving in the cost of discharging Coals from Vessels, Barges, &c. Several of these Cranes, with the necessary power, are now being erected at the Beckton Gas-Works.
DIRECT-ACTING HOISTS
For LIFTING RAILWAY WAGGONS to RETORT-HOUSE STAGEWAY; CAPSTANS for HAULING WAGGONS, &c.,
HYDRAULIC APPARATUS for Lifting and Lowering Purifier-Covers.
Sixteen recently erected at Beckton, applied to Covers 30 feet square.
GAS AND WATER PIPES, ROOFING, BOILERS, &c.
SULPHATE OF AMMONIA APPARATUS,
IN SUCCESSFUL OPERATION AT THE NEW WORKS OF THE NEWCASTLE AND GATESHEAD GAS COMPANY.
For particulars, apply to
JOHN ABBOT & CO., LIMITED,
2, SUFFOLK LANE, CANNON STREET, E.C., or PARK WORKS, GATESHEAD-ON-TYNE.

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